Chemical Age

LT GAS SEPARATION SYMPOSIUM (page 923)

VOL. 78 No. 2044

7 December 1957

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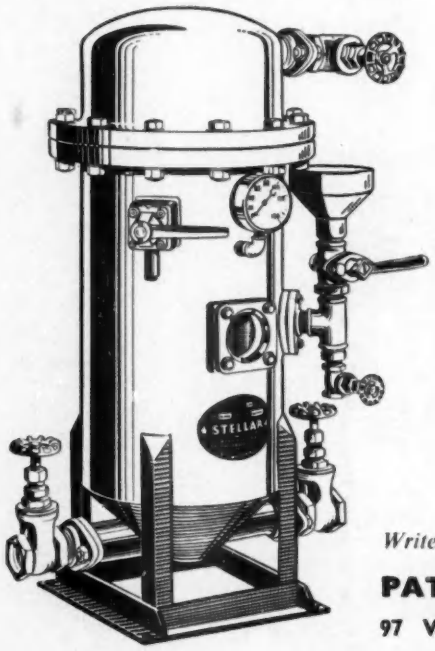

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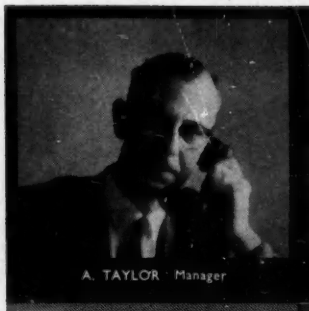
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J. G. SARGEANT Assistant Chemist (cosmetics)

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MRS. E. HIGGINS Assistant Chemist (analytical)

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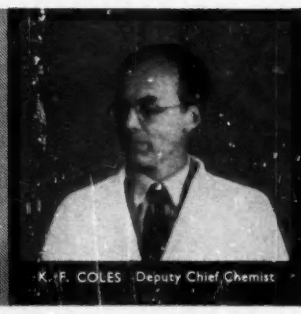
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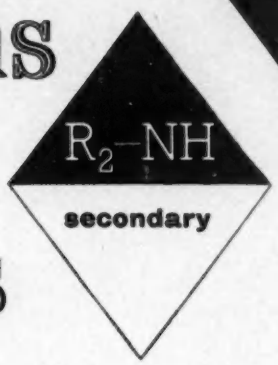

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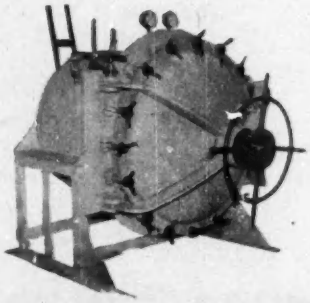

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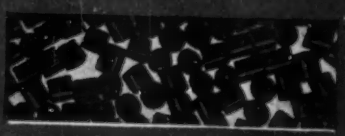

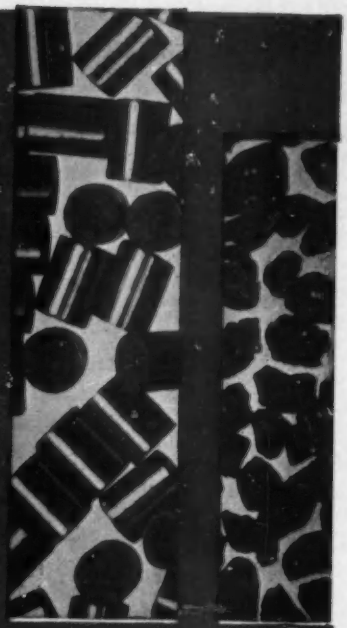

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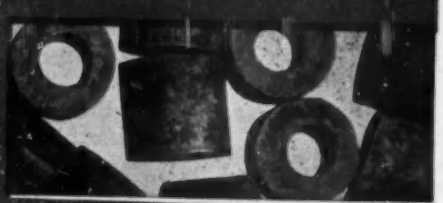

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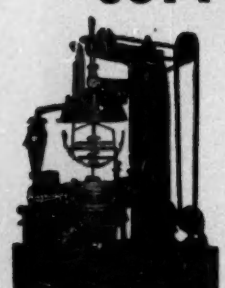

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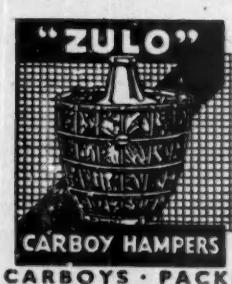

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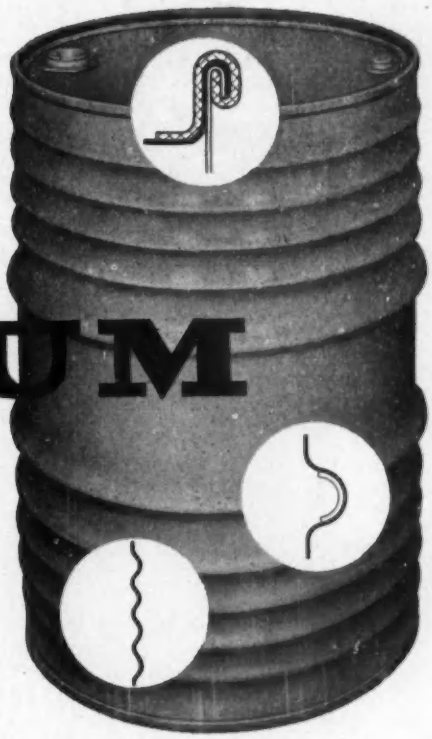

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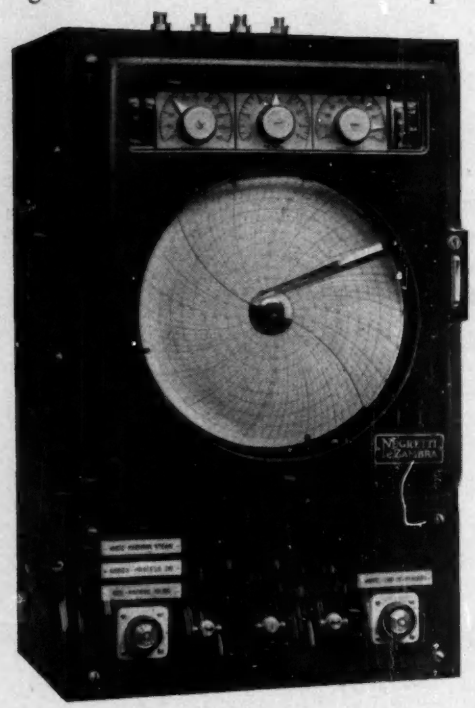

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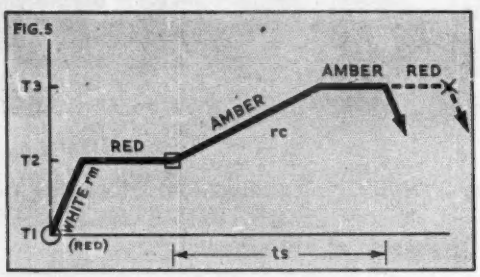

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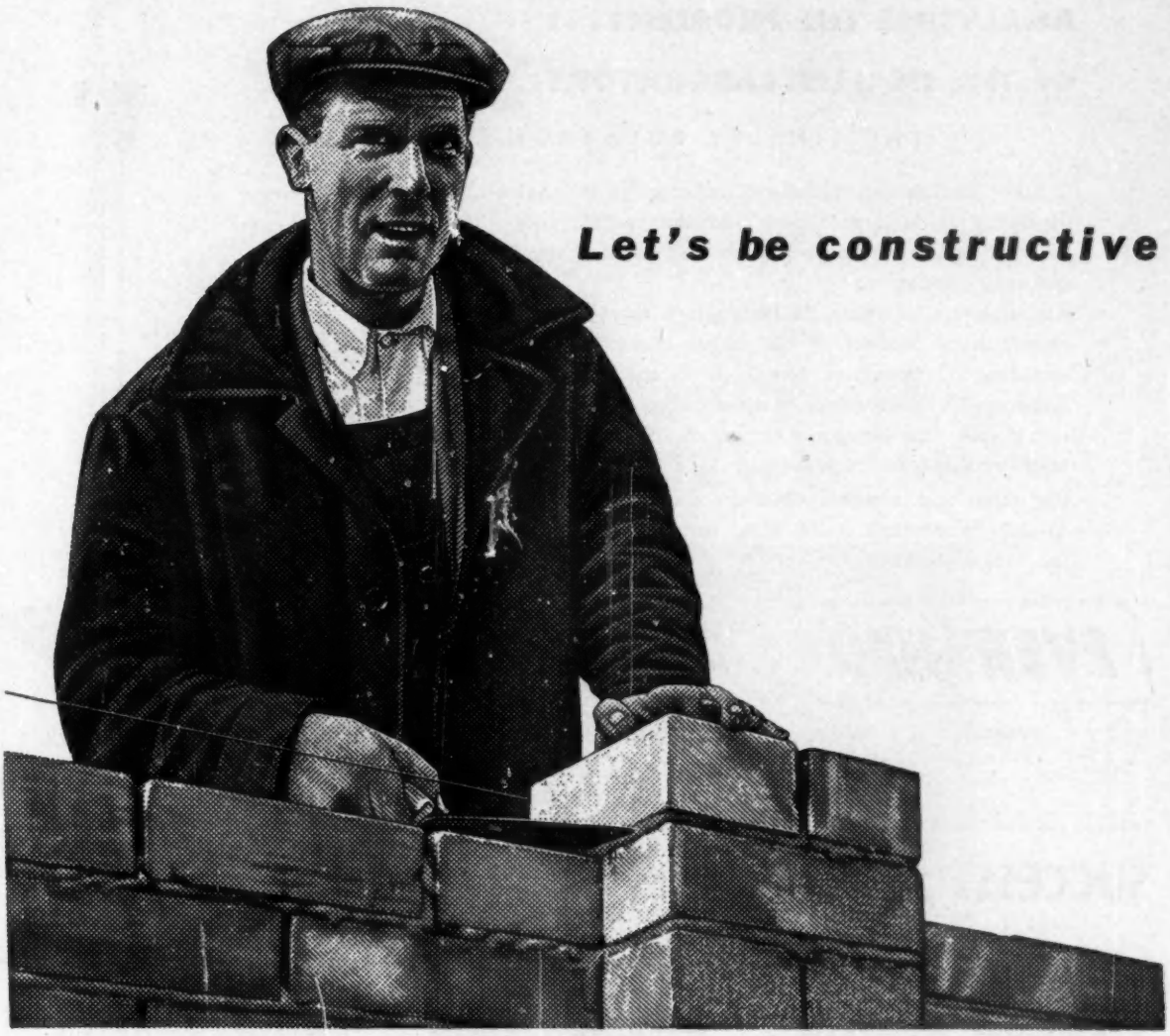

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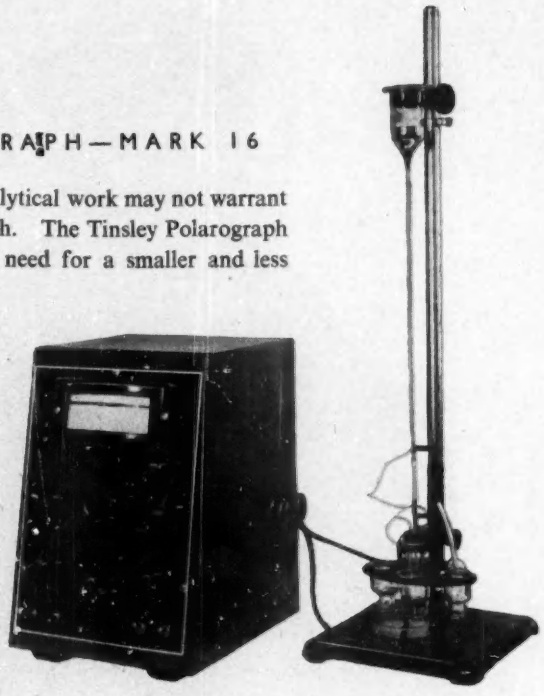

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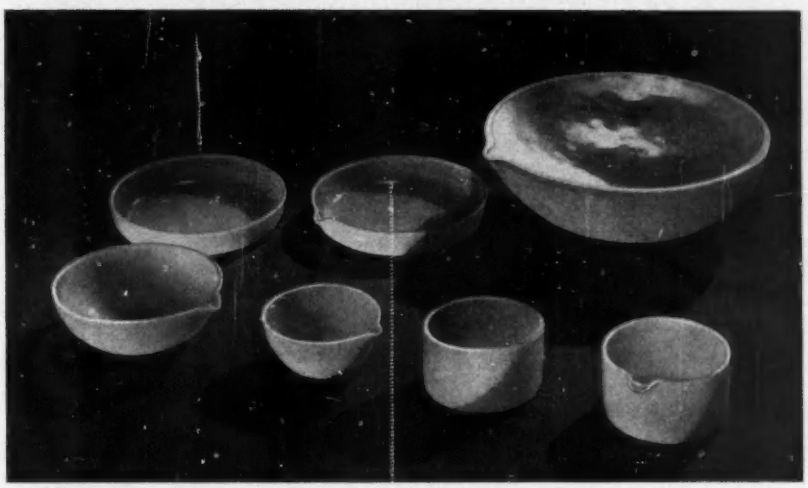

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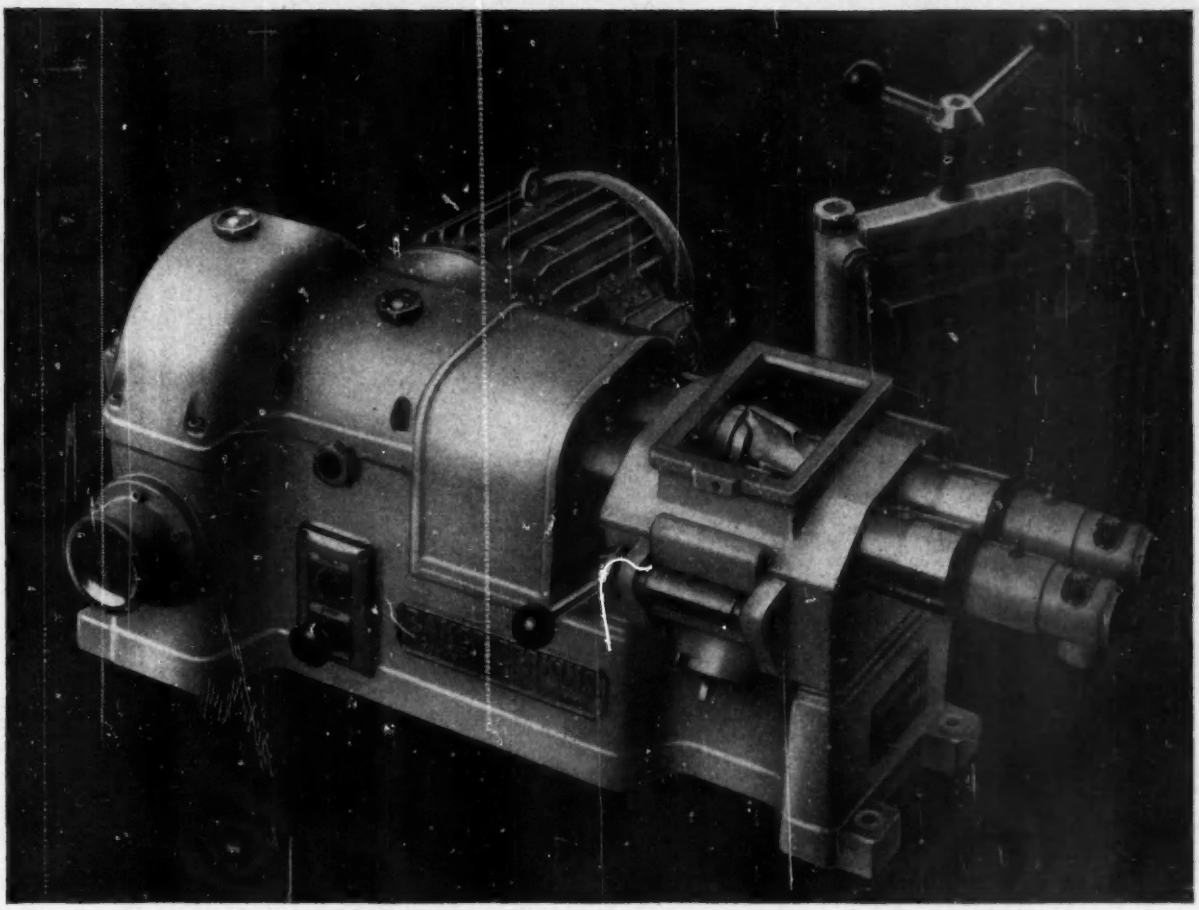

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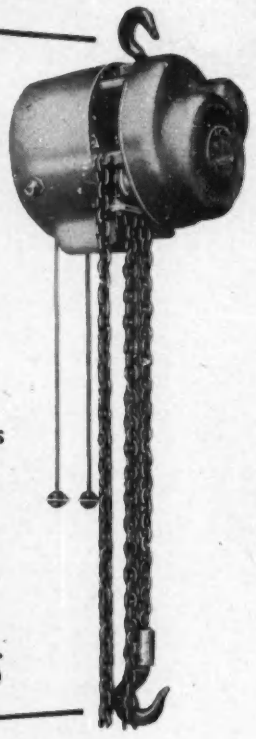

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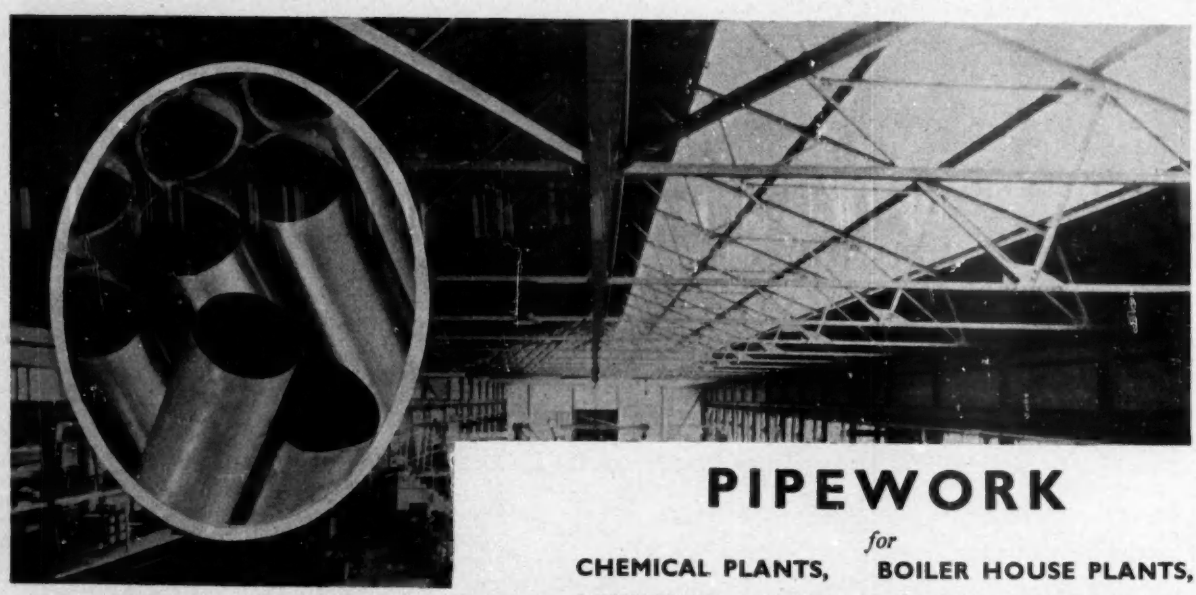

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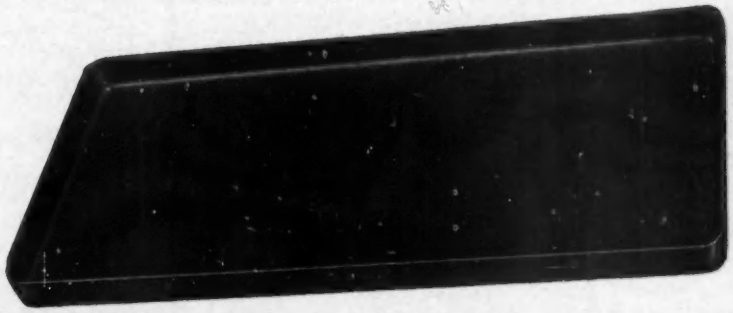

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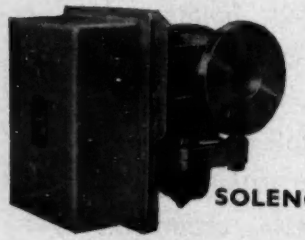

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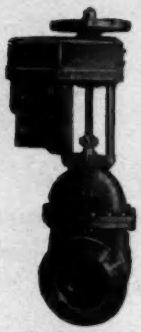

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CHEMICAL AGE

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CAUSTIC—SODA ASH POSITION

THE traditional process for manufacture of soda ash is the Solvay (or ammonia soda) process and is the only technique used on a production scale throughout the world today. Caustic soda used to be made only by 'causticisation' of Solvay-produced soda ash, also known as the lime-soda process. In the early days of electrolysis of brine for production of caustic soda, there was the problem of by-product chlorine. Output of electrolytic caustic was, however, determined for economic reasons by the market for the by-product chlorine. Today, with the growth of large-scale organic synthesis and the rôle played by chlorine in this, the position has changed.

The premise that caustic soda excesses will increase during the next decade is concerning US chlorine producers. Demand for chlorine today is such that there is now too much co-product, caustic soda, and the indications are that caustic soda supply will be greater than demands for it.

Three possible solutions have been offered. One is that chlorine should be produced without caustic soda—as is seen in the possible revival of the Deacon process (see CHEMICAL AGE, 26 October, P. 678). Chlorine consumers have ready access to abundant supplies of by-product hydrogen chloride.

A second suggestion is converting existing plants from lime-soda caustic to production of finished soda ash. (In the US soda ash demand is steadily increasing and in a few years' time new supplies will be required.) The few plants which still continue to use the lime-soda process to make caustic, however, appear to find it economic and are considered unlikely to switch to soda ash production. Thirdly, direct carbonation of diaphragm cell liquor to soda ash is suggested. While this method is workable technically it requires a combination of favourable economic circumstances to ensure that it is profitable.

The idea of using excess caustic soda to make soda ash is not exactly new, as Dow Chemicals have been carbonating caustic at their Freeport works, Texas, for the last two years.

Several processes are available for making soda ash from caustic soda at minimum cost. Which process is used depends particularly on the cost of caustic soda. Another factor of importance is the capital investment required for the erection of soda ash facilities to a chlorine-caustic plant. Where there is an existing plant setup to produce finished caustic, the cheapest type of plant would be one that uses concentrated caustic soda liquor. For new installations, a process that converts dilute cell liquor (10 to 12 per cent (N_aHO) into soda ash could be employed. Other technical methods are available to the caustic producer, and further, there is the possibility of developing new processes for use by other industries to take up large quantities of caustic. At least one US company is trying to do this, as instanced by Diamond Alkali's new iron desulphurisation method.

Utilising excess caustic soda to make soda ash is not as revolutionary as it might seem. The producer, for instance, has several economic points in his favour. The equipment required will not cost as much as a new ammonia process soda ash plant. In fact, it is the high cost of such plants that has resulted in the present lack of soda ash production facilities in the US today. In 1951, initial investment for the ammonia soda plants was

about $30,000 per daily ton capacity compared with $13,500 in 1940.

Plants to use either caustic soda or soda ash interchangeably are now being encouraged in the US. Indeed, it is understood that many of the new alkali-consuming plants are being designed to allow this. In older plants, however, equipment would have to be altered.

It is obviously not easy for producers to decide on setting up a soda-ash-from-caustic plant, for long-term economics as well as short-term markets must be carefully considered for each plant. Such plants do, however, offer the US alkali-producer flexibility for reasonable investment.

This then is the picture in the US. But in Europe it has become a custom to make up the short fall between caustic consumption and electrolytic production by causticisation of soda ash. The amount of soda ash causticised in recent years in Germany, France and Italy has remained relatively static, which suggests that increasing demand for caustic soda is being met by electrolytic material. This is to be expected, for, of course, Europe's chlorine demand is rising continuously. There are bound to be local factors in these countries, but national statistics indicate that as yet soda ash capacity is not below demand. On p. 931 will be found some details of the new plant of Dutch Soda Ash.

It will be of interest to see whether and how quickly continental Europe will approach the present American position as outlined above.

The British situation is quite different, for there would appear to be a surplus capacity for soda ash. It is considered there has been a decline in consumption of soda ash for causticisation. This implies that caustic soda from electrolysis is approaching balance with demand. In fact, the present demand for chlorine in the UK is said to be fairly slight and the problem that exists in the US does not apply.

A second factor in the decline is the displacement of soda ash by caustic soda liquor in certain soap-making processes.

Today more than half UK caustic soda is produced by lime-soda processes, and less than half by the electrolytic process. Indeed, it is suggested that the UK may well be about 20 years behind the present pattern of the US market.

WINDSCALE SCIENTISTS

EVENTS at Windscale are now taking a new turn, for the scientists employed there are asking the Prime Minister through the Institution of Professional Civil Servants, to hear their complaints that their careers have been adversely affected by the publication of the White Paper on the Windscale accident. Moreover, the Prime Minister has been asked by the institution's secretary, Mr. Stanley Mayne, that a representative of the staff employees at Windscale should be allowed to see the unabridged version of the Penney Committee's report on the accident.

It will be remembered that the White Paper stated that a primary cause of the accident was the way in which a routine operation, the Wigner release, was carried out—a physicist in charge decided on a second heating to boost the release. 'He had no pile operating manual . . . nor had he the benefit of sufficiently detailed instructions.' (CHEMICAL AGE, 16 November, p. 799 and 801).

The memorandum by the chairman of Atomic Energy Authority, Sir Edwin Plowden, stated that the authority had come to the conclusion that the cause lay partly in faults of judgement by the operating staff and the faults were attributable to weakness of organisation.

It is understood that the institution has pointed out to Sir Donald Perrot, the Authority member for finance and administration, that the second nuclear heating which is stated in the report to have been responsible for the start of the fire, had previously been carried out without incident, and had been accepted as normal practice by the AEA.

The Penney Committee agreed that the instrumentation at Windscale was not complete enough for an accurate judgement to be formed and its opinion that the second heating was carried out 'too quickly and too soon', suggests that this operation was begun when at least one of the temperature recorders was indicating that at least one part of the reactor was continuing to get hotter.

Details of the temperature recordings and all mention of temperatures were absent from the report. Also at the Press conference, no information was released about temperatures either before or during the accident, despite repeated questions about these. The institution's request to see the original report on Windscale is therefore a demand that this information should be released, or that the charges of 'faulty judgement' made against the Windscale staff should be withdrawn.

In a letter to Sir Edwin Powden, Mr. Mayne states that the published report is 'wrong in a number of material details, hasty in forming conclusions on inadequate data and unfair in making accusations—in short, much more anxious to find scapegoats than causes.'

As the matter stands at present, the institution intend to give evidence before the Fleck committee, and the Prime Minister has to decide whether the full technical report of the Penney Committee can be seen by the scientists.

Hopes have been expressed that the reports of the three Fleck committees will be published, although it seems only too likely that these, if made public, will be similar to the White Paper, in being prepared from the full technical report. It would probably have proved less complicating to have released no information about the Windscale accident, other than the Medical Research Council's.

US A-POWER PROGRAMME

IDEAS that the US would have working nuclear power available to start in 1963 are now considered to be too optimistic according to the US Atomic Energy Commission's director of reactor development Mr. W. Kenneth Davis, for at present the US has no reactor system in a stage of development to permit large scale exploitation of nuclear power in the near future.

While the UK has decided on its atomic power programme the US AEC has not yet taken any decision. Davis, in fact, has said that if a reasonable programme cannot be formulated, there will be a delay of five years or more in arriving at the amounts of nuclear power AEC forecasts. He advocates a programme to exploit the potentialities of water cooled reactors even if efforts on more advanced types are slowed down.

'Water' reactors, i.e. water cooled or moderated types, Davis considers, are the only types of power reactors that can confidently be expected to be economically competitive by 1963 or 1964. The reasons he gives are that it is likely that capital costs for the first series of large experimental water reactors will not be as high as some other types. Also he believes that these plants can produce two or three times as much power as their original design rating, with little change in plant design.

Another suggestion made by Davis is that considerable economy can be effected by building very large units. Economic nuclear power reactors for the US are likely to have installed generating capacities of 300,000 kW each, and in due course power stations of a million or more kilowatts capacity. A further economical factor in favour of 'water' reactors is fuel replacement costs. Davis states that it is not unreasonable to estimate decreases in fuel material costs by a factor of two, decreases in fuel fabrication costs by four, and increases in useful fuel life by a factor of eight. He bases these costs on preliminary results of work now in progress.

Monsanto Tred Plant Now in Production

THE new 4,000-ton plant for the batch production of Tred rubber reinforcing resins, recently commissioned at the Newport factory of Monsanto Chemicals Ltd., was inspected last week by representatives of the footwear soling and other industries. They were welcomed at the works by Dr. J. W. Barrett, director of the company's plastics division. While at Newport they saw many other plants, including the new phthalic anhydride unit, which is just coming into commission.

The new resins, two of which have been designated Tred 50 and Tred 85, are high styrene/butadiene copolymers, Tred 50 being a creamy white, rubber-like material and Tred 85 a white granular resin. The main raw materials are styrene, which is supplied by Forth Chemicals Ltd., and butadiene, which comes from British Hydrocarbon Chemicals Ltd.

The resins are produced by emulsion polymerisation of the monomers to form latices, followed by coagulation, filtering and drying to give the final Tred crumb. They have been available on pilot-plant scale from Ruabon for some time.

The processes used in the new plant were devised by the company's research department, and the plant was designed and constructed by the Monsanto engineering department. Initial start-up and proving operations have been carried out by a team drawn from research, production and engineering departments.

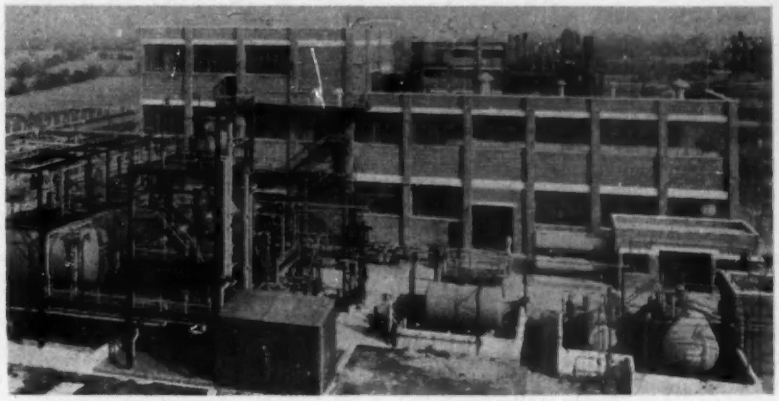
Some plant and equipment was ordered outside the UK in an attempt to avoid long delivery dates, but delays did occur and they held up commissioning of the plant.

The main plant building is separated by a service road from its tank farm, which contains butadiene bulk storage and styrene day storage. One end of the building contains the polymerisation and monomer recovery units, which are housed in a flame-proof section.

The remainder of the plant occupies two floors. Most of the ground floor is devoted to latex storage tanks and processing tanks. Also housed here is a rotary filter with ancillary equipment and a shredder and elevator of the Tred 50 copolymer production unit. The rest of the floor is occupied by the finished product packing and warehouse area, and a small workshop.

The first floor contains the coagulation and drying units for the copolymers, plant offices and control test laboratory. The main effluent flow from the plant passes through an interceptor pit where any solid material is removed before entering the works' effluent system. All parts of the plant are laid out for progressive expansion.

Styrene monomer and butadiene are both received in road tanker, the butadiene being discharged to tanks under pressure in liquefied form. Batch quantities of both monomers are pumped to the polymerisation section as needed, using preset flow meters to record the change.



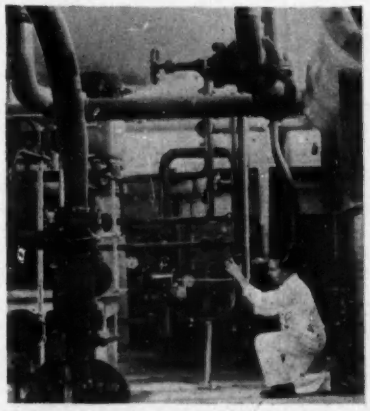
General view of the Tred copolymer plant from Monsanto's Lustrex building. In the foreground are butadiene (left) and styrene monomer (right) storage tanks

The latices are produced by batch emulsion polymerisation of styrene/butadiene/water mixtures. Certain reactions are not taken to completion and unreacted styrene and butadiene are removed in the monomer recovery section for re-use in subsequent polymerisations.

A feature of the latex storage unit is the use of wooden vats, which are fitted with slow-speed agitators. Equipment is available for the preparation of any necessary additives to the latices, which are pumped to the coagulation sections or to a drum-filling point as required.

In the production of Tred 50, the latex is coagulated in further agitated tanks and the resulting crumb and serum overflow to a residence tank and then to a Locker vibrating screen which separates the serum. The serum is drained to a storage tank and the wet crumb is washed and discharged to a tank in which it is reslurried.

The slurry is filtered and washed in a rotary vacuum filter from which it emerges, after removal of excess water, as a wide, thick sheet. This sheet is cut into lengths by a pneumatic cutter and reduced to crumb size by a shredder. After drying on a band drier, the crumb passes into a finished product hopper, from which it is packed into 45lb. multiwall paper sacks and palletised for shipment.



Polymerisation section of the copolymer plant at Newport

For Tred 85, latex is pumped from a storage tank to the coagulating section, from which it overflows to a residence tank before passing to a batch filter. The serum is removed by vacuum and the granular residue washed with water. The moist resin is raked out on to a conveyer and elevated to an intermediate storage hopper which feeds a rotary drier. The dry resin next passes through a granulator to determine the particle size. The finished product is stored in a hopper from which it is also packed into 45lb. multiwall paper sacks.

In the event of a power failure, the motors of the agitators of the polymerisation vessels and of the circulating water pumps can be supplied with power from an emergency diesel generator. The supply of cooling water is included in this emergency arrangement.

Monsanto state that the use of Tred resins for the reinforcement of natural and synthetic rubber compounds gives stocks of increased modulus and hardness and other properties favourable to the production of compounds for shoe-soling, flooring, luggage and rollers. Tred 85 contains 85 per cent and Tred 50, 50 per cent of combined styrene.

It is claimed that the resins permit the incorporation of high volumes of fillers and give a smooth finish to milled or calendered stocks. By using white fillers in a rubber stock containing Tred, reinforcement approaching that of carbon black reinforced stocks may be achieved. Such white stocks can be coloured to give stocks to match leather shoe uppers.

Tred resins are easily dispersed in either natural rubber, GR-S, Neoprene or acrylonitrile rubbers. They are claimed to resemble leather in stiffness, hardness and colour, but with three to four times the durability.

DAME LONSDALE AWARDED ROYAL SOCIETY'S DAVY MEDAL

PRESENTING the Davy Medal, 1957, to Dame Kathleen Lonsdale, D.B.E., F.R.S., at the anniversary meeting of the Royal Society, Sir Cyril Hinshelwood, president, said she was a pioneer in the field of X-ray crystallography. She joined Sir William Bragg's original team of workers in the early 1920's and made many accurate measurements on the various organic crystals that were then being studied in the laboratory. One of her first tasks was of a more mathematical nature, that of working out the consequences of space-group theory in terms of diffraction effects, a task that was completed and published with W. T. Astbury in 1924.

She was, however, most widely known as a careful and accurate experimental investigator. The great triumph came in 1928 with her complete elucidation of the structure of hexamethylbenzene. This work established the true geometry of the benzene ring for the first time and paved the way for all future X-ray studies on the aromatic hydrocarbons.

It has been the simple rather than the chemically complex structures that have generally appealed most to Dame Kathleen and the problems of crystal physics rather than those of chrystal chemistry. Her studies of the thermal vibrations of atoms in crystals have been a continuing interest and she has made outstanding contributions, both in theoretical treatment and in very beautiful experimental work, to the subject of the diffuse scattering of X-rays by crystals.

Sir Cyril also mentioned her work by the method of divergent-beam X-ray photography on the diamond structure which had enabled the fundamental lattice constant to be determined with extraordinary precision. Dame Kathleen is head of the University College department of crystallography.

Copley Medallist

Of the recipient of the Copely Medal, Sir Howard Florey, F.R.S., Sir Cyril said that Sir Howard had made a number of outstanding contributions to experimental pathology and medical science. He was best known for his work in connection with the isolation and detailed study of penicillin and its development as a successful non-toxic, anti-bacterial agent. His earlier work on mucin and its functions were noted and his further investigations on this by auto-radiographic methods depending on the use of ^{35}S. Florey's investigation of the effects of cortisone on cell division and his recent work on the discovery, development and mode of action of new antibiotics, including cephalosporin N, nisin and micrococcin were notable.

All Florey's investigations were characterised by the choice of difficult and worthwhile problems and by a fine technique which had usually involved both the development of original methods and the use of methods new to the particular problem.

Among other awards, he presented a Royal B Medal to Professor F. G. Gregory, F.R.S., whose work in plant physiology 'has been dominated by an appreciation of the importance of the responses of the intact integrated organism and has been of decisive importance for this subject.'

Gregory's early work included the elaboration of a technique that analysed growths in terms of three parameters, relative growth rate, net assimilation rate and leaf area ratio. He was a pioneer in studying vegetative growth in a controlled environment. Gregory produced the first cogent evidence for the operation of a specific chemical stimulant for leaf growth. Subsequently he had been concerned with nutritional effects in growth and with the nature of the mechanism that determined the induction of the reproductive phase. The nutritional studies had extended over the last 30 years and provided the most extensive analysis available of the effects of nitrogen, phosphorus and potassium.

In his anniversary address, Sir Cyril discussed observations on the mechanisms of chemical reactions.

Pipelines for Shell's Partington Feedstock

Shell Chemical Co. Ltd. in conjunction with Shell Mex and BP are proposing to link by underground pipelines Stanlow, near Chester, and Partington near Manchester, a distance of 25 miles.

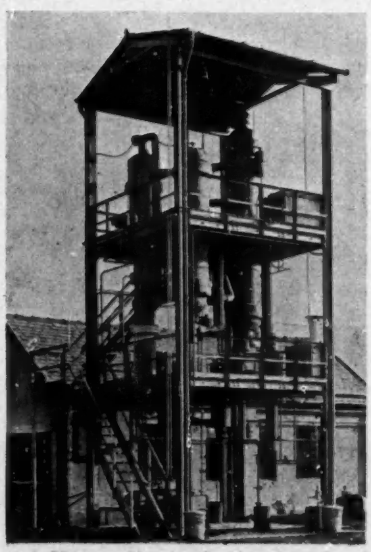
At present the feedstock for the chemical works at Partington is shipped in barges via the Manchester Ship Canal. But an expanding demand for chemicals based on petroleum derivatives has made it apparent that the most economical and efficient method of moving the increasing feedstock requirements from Stanlow to Partington is by pipeline. Similarly, some of the material produced at Partington may require further treatment at Stanlow and some of the pipelines may be used in this direction.

Shell Mex and BP also intend to construct a new storage depot on land adjacent to Partington chemical works. Petroleum products required for distribution from this depot will be supplied through Stanlow Refinery and here again it has been found that the most economical and efficient method of bringing the products from Stanlow to Partington will be by pipeline.

NC Pilot Refining Plant for Crude Benzole Now in Operation

THE pilot plant for refining crude benzole, naphthas and other hydrocarbon oils, erected at the Thorncliffe works, near Sheffield, of Newton Chambers and Co. Ltd. (CHEMICAL AGE, 3 August, p. 179), is now in operation. The catalytic hydrogenation process being used was the result of work over several years by the Coal Tar Research Association. Newton Chambers, by agreement with the association, have the world rights for manufacturing the plants to operate it.

Following the first announcement last August of the proposal to erect the pilot plant, great interest was aroused both at home and abroad. Enquiries were received from Czechoslovakia, Russia, South Africa and Canada, as well as from the UK coal tar industry.



Newton Chambers' pilot plant

This present plant has a capacity of 500 gallons of crude benzole daily and is designed for continuous operation. It is now announced that the plant is successfully de-sulphurising coke oven benzoles of British origin having total sulphur contents greater than 2.0 per cent.

While other plants for similar purposes have been known previously, particularly in Germany and the US, this is the first UK effort to tackle the problems peculiar to the UK benzole industry. An important aspect of the development is that it makes possible an increase in the quantity and quality of the home-produced contribution to the country's motor fuel supply.

Oil Companies Spend £15.7 million on Chemicals

ORDERS for oil equipment and materials valued at £101,286,000 were placed with UK firms during the first nine months of this year. This is below the £114,221,000 spent in the same period of 1956 but is well above figures for any other year, according to the Council of British Manufacturers of Petroleum Equipment.

Among the principal categories of equipment were: tubulars, pipe-fittings and valves (£18.3 million); specialised drilling and production equipment (£14.5 million); tools and machinery (£8.8 million); electrical equipment (£5.8 million). In addition, oil companies purchased large quantities of chemicals, valued at £15,728,000.

Fisons' Bramford Plant

Fisons announce that their Bramford horticultural fertiliser plant, near Ipswich, remodelled at a cost of £265,000, will be in production by the end of this year.

BUTYL POINTS WAY TO NEW SYNTHETIC RUBBERS

THE development of butyl rubbers with different functional groups is now possible. From these could be expected a wide spectrum of new synthetic rubbers. They will have a hydrocarbon skeletal molecular chain provided with the necessary marginal functionality for cross-linking. Butyl rubber as the successful pioneer had shown the way ahead. Also, the availability of a wider range of new rubbers will bring many advantages. These points were made by Dr. William J. Sparks, scientific adviser to Esso Research and Engineering Co., in a talk on Tuesday on 'Development of butyl—the modern synthetic rubber.'

Dr. Sparks said that the development of butyl to its present position as a successful synthetic rubber had brought with it many completely new ideas about the nature of rubber-like behaviour. Before 1937 synthetic rubber research had been directed towards duplicating the structure of natural rubber as far as possible and extensive efforts were made to polymerise isoprene and other diolefins into the highly unsaturated long molecules characteristic of natural rubber. The discovery by Esso Research of polyisobutylene of high molecular weight had upset many of these theories.

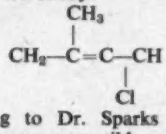
Despite its complete lack of unsaturation, high molecular weight polyisobutylene closely resembled natural rubber in: tensile strength, elasticity, rebound, X-ray structure, fractional solubility, mechanical orientation.

Designated Butyl Rubber

The vulcanisable rubber of low unsaturation made by the co-polymerisation of a large proportion of olefin with a small proportion of diolefin was designated butyl rubber. Because of the absence of conflicting side reactions when butyl rubber is vulcanised, quantitative relationships could be derived between physical properties and the number of cross-links produced during vulcanisation. This work was extended to a determination of the disulfide nature of the cross-link, and this in turn led to an explanation of reversion due to overvulcanisation and to an understanding of the kinetics of the vulcanisation reaction.

Fillers, Dr. Sparks said, were essential in the commercial utilisation of rubber. The application of reinforcing carbon black to butyl rubber produced valuable observations on the nature of the changes which occur. These indicated a chemical bonding between the butyl rubber and the carbon black. Although this chemical bonding had been suspected from observations with other materials, it was the quantitative relationships already established for butyl rubber which finally led to the new concepts of a dispersion of carbon black in which shearing of chemically bonded particles was involved.

With its departure from the 'classical' concept of rubber structure, butyl rubber was leading the way towards the development of new synthetics. Butyl stimulated research on the vulcanisation reaction and this encouraged the development of polymers with functional groups other than double bonds. Partners with butyl, polymers of this type are already becoming commercially significant. In particular, chlorinated butyl having the following structure was mentioned briefly.



According to Dr. Sparks chlorinated butyl is more compatible with natural rubber than ordinary butyl, it vulcanises with many cross-linking agents other than sulphur and it gives vulcanisates of exceptional heat stability. The claim is made, moreover, that it is capable of still further modifications, which, for example have improved resilience at room temperature.

Advantages from the availability of a wider range of new rubbers would include their use in composite tyres, because of their compatibility with butyl. Each component rubber would serve the function for which it is best suited.

In the US a main outlet for butyl rubber has been in inner tubes for tyres. Development of butyl for use in tyres had posed many problems. The first difficulty had been in processing, the new tubes having been very poor splicing properties. At low temperatures buckling had occurred. Early attempts to build a butyl tyre had shown weaknesses in the bead performance, the flipper had shifted during tyre moulding, the tread separated and reversion occurred in the shoulder area.

The durability of butyl tyres was indicated by Dr. Sparks. In a test commercial GRS-natural rubber tyres at 135 per cent load at 110°C. failed at 4,650 miles. The best butyl tyres at 165 per cent load reached a temperature of only 104°C. and failed after 6,400 miles.

In the high-speed wheel test commercial tyres fail at 95 m.p.h. while butyl tyres of the same design fail at 105 m.p.h. Special properties associated with butyl tyres were less noise on sharp curves, better riding quality and skid resistance on both dry and wet roads.

Discussion

At the end of his lecture Dr. Sparks answered questions regarding butyl. It was asked whether butyl tyres would be suitable for UK cars having regard to the harder springing and the greater amount of cornering required on British roads. Dr. Sparks felt that butyl tyres might prove to be even better for UK cars than US cars.

In answer to a question on fuel economy with the use of present-day butyl tyres, it was stated that fuel consumption was somewhat (3 per cent) higher than with GRS and compared with rubber, 4 per cent higher. A better degree of performance is expected for butyl tyres.

Asked why braking was better with butyl tyres, Dr. Sparks explained that tests with GRS rubber had shown that braking was accomplished in large jerks while with butyl tyres braking was in small jerks. This looked like better resilience properties of butyl.

Cost of butyl as a raw material for tyres as against other rubbers was another enquiry: Dr. Sparks said that as a raw material butyl was the cheapest rubber but tyre production was more costly at present. This was due to the advantage held by GRS where there was plenty of reclaim GRS rubber available, but as butyl tyres were only recently on the market, there was little butyl reclaim.

Another member of the audience asked whether reinforcement involved lengthy mixing and what was the limit of carbon loading required. Dr. Sparks replied that the time taken for mixing was five minutes at 400°F. Butyl did not go through the cycle process but chemical agents were used. Esso were using Elastopar (N-methyl-N-4-dinitroso aniline) and 18 to 20 minutes only were required for curing.

Replying to a question on unsaturation of natural and synthetic rubber and whether it wasn't more rational to increase the unsaturation of butyl rubbers to more closely simulate the properties of natural rubber, and increase resilience, Dr. Sparks said that butyl rubber was brittle. Although it bounced it was subject to shock.

The use of non-black pigments was raised. Dr. Sparks stated that Esso had produced a red tread which wore clean and had 85 per cent abrasion resistance. The problem of not using carbon black and the production of many different coloured tyres was one of marketing, US garages etc., not favouring the keeping of large stocks of assorted coloured tyres.

Another questioner raised the point of reactiveness of chlorinated compounds. Dr. Sparks said that butyl tyres had not so far given rise to any storage problem.

Asked whether radioisotopes had been used for vulcanisation of butyl, Dr. Sparks stated that butyl was not stable to radiation.

Replying to a question on whether the tubeless tyre in the US had affected the butyl tyre market, Dr. Sparks indicated that at first the butyl tyre market had suffered and this had been responsible for developing other uses of the rubber. In the Los Angeles district the high ozone content of the air had attacked GRS rubber used as window seals and on other exposed parts of cars. GRS rubber had now been replaced by butyl rubber by several leading US car manufacturers. The fall in demand for butyl had now levelled out in the US.

Chinese Trade Mission Visits UK Plants

AMONG organisations visited by the Chinese Economic and Trade Mission, now in this country, were John Thompson Ltd., Wolverhampton, and Leicester, Lovell and Co. Ltd., Southampton.

At John Thompson's works, Mr. Teng Chao-ming, general secretary of the mission, attended a technical discussion on the pressure vessel which the company are building for the Berkeley, Gloucestershire, nuclear power station.

The visitors to Leicester, Lovell included Mr. Kang Tieh-chun, deputy director of the Tientsin Industrial Research Laboratories.

★ SIGHT last week of the large new phthalic plant of Monsanto Chemicals at Newport, led me to make a few enquiries about UK capacity. It is, of course, not possible to say exactly what tonnage is produced because at least two plants in this country are not being run to capacity.

There are five producers: Monsanto, at Ruabon, Reichholds, Plastinol, ICI and United Coke and Chemicals; the latter two companies using the troublesome fluidised bed process. My estimate is that at present, capacity is being utilised to the extent of about 20-24,000 tons a year; by the end of 1958, this figure should be between 34-35,000 tons. It is thought that only production from ICI, Monsanto and UCC is available for sale.

My end-1958 estimate is based on the expectancy that plants not now being used to capacity will by then be operating more efficiently, even if not to the rated figure. It also includes production from Monsanto's plant at Newport, which is just coming into commission and which should be in full operation early in 1958. By then Monsanto production will top the 15,000 tons a year mark.

The company has been producing phthalic anhydride in this country since 1936 and their experience with the Ruabon plant has been most successful. There can be little doubt that the new plant would, therefore, use the same process and not the fluidised bed.

★ 'HARWELL is reduced to buying second-hand test tubes obtained from the liquidation of laboratories closed through the shortage of science teachers.' Sir Cyril Hinshelwood, president of the Royal Society, at the anniversary dinner in London last week, added: 'But that is probably an exaggeration'!

He was illustrating the gravity of the position brought about by the shortage of scientists and added: 'Unless what the advertisers now call the "top people" stop regarding science as beneath their dignity, this country may as well put up the shutters as far as its future in the modern world is concerned.'

★ DESPITE the dramatic growth in the proportion of chemicals now being produced by the petroleum route, there can be little doubt that the future will see a continuing expansion in the tonnage of chemicals produced from coal. A progressive increase in the amount of coal available for use as a chemical raw material should accompany the building of the larger atomic power plants.

This point was taken up by Sir George Nelson, managing director of the English Electric Co. Ltd., at a Cardiff dinner last week. He said it was criminal waste to burn coal and oil in power stations, factories and homes when it was a storehouse of vital and important chemicals.

The importance of nuclear energy was not that it would replace coal and oil, but that it would divert them from their wasteful use as a fuel to the more economic field of a supplier of chemical raw materials.

★ IS management failure to blame for the fact that production has been practically stagnant for the past two years? Mr. B. H. Moldauer, sales executive of M. W. Hardy and Co. (Mercantile) Ltd., chemical merchants, Great Winchester Street, London believes it is. He gave his reason at a recent meeting of members of the south-west London section, British Institute of Management.

Talking about the 'Fruits of Management', Mr. Moldauer said that productivity in Britain had risen 14½ per cent from 1953 to the first half of 1957; this compared with 34 per cent for Italy, 42 per cent for France, and 46 per cent for West Germany. The reason, he felt, could be found in the general lack of appreciation in industrial and other forms of undertakings of what management entailed.

If new methods of production, of materials handling, or of costing, did not give increased output per man and higher efficiency, there were two further approaches. First there was enormous scope for improvement in communications between management and men; secondly, high executives and directors were too far away from the detailed work.

★ THAT the unemployment benefit fund of the British Association of Chemists has paid out nearly £800 for the year ended 30 September, an increase of about £300, is a symptom of the redundancies brought about by reorganisations and mergers. About 80 per cent of the claimants this year were members over the age of 40.

November issue of the BAC journal, *The British Chemist*, particularly mentions the after-effects of the Courtaulds/Celanese merger. The recession in UK exports of rayon fabric has resulted in staff reductions, including many scientists and research workers. Among those affected are a number of BAC members in the 'over 40' age group who have spent most of their working lives with the organisation.

It is, unfortunately this group that has most difficulty in finding other posts. In addition to the unemployment benefit fund, the association also provides an appointments service for the benefit of members in such circumstances.

★ CUTTING the accident incidence is a serious problem in the chemical industry. It is not by chance that ICI plants generally have an excellent record in this respect for the element of competition is keenly fostered throughout all the plants in an attempt to reduce lost time through accidents to a minimum.

During 1955 and 1956, the average working time lost in UK industry by occupational accidents was 20 million mandays, the equivalent of a working force of 80,000 men—about enough to meet ICI's total hourly-paid labour requirement. Apart from that about 150 trained workers are lost each year through fatal occupational accidents. Compensation for accidents in industry, excluding common law claims, amounts to £25 million a year.

These figures were given by Dr. W. H. Garrett, a Monsanto director, at a recent ICI safety conference for senior management, the first of its kind in the country. (For report see p. 929.)

★ TREATMENT of industrial wastes has been a headache to chemists and the chemical industry for many years and will continue to present an increasing problem. The rapid expansion of the industry and the growing complexity of operations make for more costly effluent treatment.

With that in mind, the industry should be particularly interested in the FBI report on the treatment of trade wastes in West Germany (see p. 927). In particular, the work of Chemische Werke Hüls commands attention. Wastes from the many different operations are first handled separately at each plant and then fed into the main effluent stream where they are further processed for the removal of impurities.

In the main collection basin, aquatic plants have been cultivated both to indicate final purity and to assist in some photosynthetic oxygenation. That is not the end of the firm's interest in its wastes. At the point of entry to the river Lippe, goldfish and Lippe fish are kept in aquaria as a biological control of effluent quality.

★ ON Tuesday the Russian magazine *Soviet Aviation* reported that Soviet intercontinental ballistic missiles are powered by liquid fuels. Details are also revealed regarding the engines. Cooling of the nozzle through which the exhaust gases are released is provided by the circulation of the propelling fuel through the internal structure of the nozzle itself.

The temperature reached by exhaust gases at this point is 3,000 °C. (a temperature at which all known fuels, including liquid boron-containing compounds, would burn to produce extra thrust for the engine).

Alembic

LOW TEMPERATURE GAS SEPARATION

Papers at London Joint Symposium Summarised

EIGHT papers on 'Recent developments in industrial low temperature gas separation' were read at the joint symposium sponsored by the low temperature group of the Physical Society and the Institution of Chemical Engineers held on 26 November at the Royal Institution, London.

The symposium papers were as follows: 'The approach to minimum power consumption in low temperature gas separation', Dr. G. G. Haselden (Imperial College, London); 'Ammonia synthesis gas from reformer tail-gas', by Mr. M. Jester (Air Products (Great Britain) Ltd.); 'Special problems arising in the design of tonnage air separation plants', Mr. P. M. Schuftan and Mr. A. G. Mackie (British Oxygen Ltd.); 'Recent developments in industrial oxygen production', by Mr. M. A. Dubs (Linde Co. division of Union Carbide Corporation, US); 'Low temperature separation of hydrocarbons', Mr. Charles C. King (chemical process division, M. W. Kellogg Corporation, US); 'Low temperature recovery of olefins', Mr. L. B. Baker (E. B. Badger and Sons Ltd., London); 'Purification of hydrogen for distillation', Mr. W. H. Denton, Dr. B. Shaw and Dr. D. E. Ward (Atomic Energy Research Establishment, Harwell); and 'The application of electronic digital computers to the design of low temperature plant', Mr. R. W. H. Sargent (Air Liquide (Oxyton Ltd.)).

Minimum Power Consumption

AIR separation was selected by Dr. G. G. Haselden as a suitable process for a detailed study of the importance of achieving low power consumption in low temperature gas separation. The author stated that the best of present-day tonnage oxygen plants (such as Linde-Frankl oxygen plant) requires a feed pressure of 5.8 atm. absolute, representing an overall efficiency of about 18 per cent, while cracker-gas plants, effecting only a partial separation, require feed-gas pressures of at least 7 atm. absolute, the overall efficiency being of the order of 5 per cent.

The incentive to low power consumption in low temperature plant arises not only from a consideration of operating cost (tonnage oxygen production power cost in Europe accounts for about 60 per cent of the final product cost) but because of the capital cost of compressors and their prime-movers and services. Main areas in which further improvement can be sought are heat exchange and fractionation.

Plant irreversibility of a modern tonnage oxygen plant indicated by Dr. Haselden were as shown in Table I.

TABLE I

Approximate Distribution of Losses in a Linde-Frankl Plant

	Distribution of power consumption (%)	*Distribution of losses in low temperature plants* (%)
Irreversibility of compressor	42	52
Irreversibility of columns	20	—
Irreversibility of heat exchange	9	23
Heat in leak	7	15
Expansion valves	2	5
Irreversibility of turbine	2	5
Irreversible work of separation	18	—
	100	100

From this it is apparent that the greatest loss of energy occurs in the compressor. However, a reduction of losses in the column, will reduce the work requirement at the compressor and hence the compressor loss. Dr. Haseldon therefore dealt particularly with the reduction of column and heat exchange losses.

For heat exchange losses of regenerators or reversing exchangers, it is suggested that these can be further reduced by employing forms of heat transfer surface which give maximum heat transfer with minimum pressure drop. Use of the Philips-type gas expansion refrigerator for cooling an auxiliary feed stream is stated to be worthy of consideration. Boiling-film heat transfer coefficients can be improved by making greater use of the 'climbing-film' effect and by synthesising heat transfer surfaces, which are stated to promote bubble formation at lower degrees of super heat than are possible with the present surfaces.

With regard to the reduction of fractionating column losses, Dr. Haselden reported that any practical attempt to approach ideal non-adiabetic column operation by the use of distributed heating and cooling sources operating over extended zones of the column would be most effective for moderate product purities. If high purity products were required then distributed heating and cooling sources had to be supplemented by constant temperature sources providing condensation and reboil at the ends of the column. It was possible, also, to make a simple approach towards ideal column operation by adding about half the reboil heat at a single level in the column a little below the feed at about 88°K, the remaining half being added at the terminal temperature of 92.7°K.

Methods of approaching ideal column behaviour were then considered. These were enriched air cycles employing dephlegmators, the Oxyton cycle, cold compression, single column cycles and modified double column cycles.

If the dephlegmator is to be of value, condensation should be brought about by the partial evaporation of a liquid mixture undergoing fractionation, and heat can be liberated over a wide range of temperature by a system which yields relatively pure products.

The overall effect of the three-column system in the Oxyton cycle gives more nearly reversible operation of the lower column and permits more nitrogen to be expanded in the turbine compared with the normal Linde unit, but the efficiency of the upper column is not appreciably changed. A total power consumption of 12.0 kWh. per 1,000 cu. ft. of pure oxygen (produced at 95 per cent purity) is claimed.

Single column cycles as in the Nescol cycle provide independent control of reflux ratio and therefore permit the optimum value to be used. There is, however, the disadvantage of extra heat transfer equipment and associated losses for the recycled stream, while introduction of an indirectly cooled condenser causes an additional temperature difference for heat transfer.

The modified double column cycle such as that described by the Messer Co., is stated to have the advantage of a greater refrigeration provision in the plant rather than a very low consumption. An alternative embodiment of the advantages of a liquid air reflux at an intermediate level in the column above the feed and an intermediate vapouriser in the column below the feed, was illustrated by reference to the flow sheet of a plant being built by Societe l'Air Liquide for Nitratos Castillos in Spain. This plant is to produce a proportion of high-purity nitrogen together with dry oxygen. Heat exchangers are used for warming the product streams. If the plant is required to produce medium-purity oxygen, regenerators would be used for both product streams. Dr. Haselden states that it is claimed that the plant would operate with all the air entering at a pressure of only 4.35 atm. absolute.

Column Features

Desirable column features of a high efficiency air separation cycle listed by the speaker were:

(a) one intermediate source above the feed level;
(b) the section of column below the feed should be heated over a range of temperature levels;
(c) the bottom production should be withdrawn from the column as liquid and evaporated separately at near constant temperature; and
(d) if a dephlegmator is used the boiling range of the evaporation system must match the condensing range of the condensing system.

All these features can be incorporated in a relatively simple cycle, it is reported, which employs a non-adiabetic distillation column. In this cycle, feed air is compressed to only 4.0 atm. absolute and cooled in regenerators. About half the air at saturation temperature is then taken to a fractionating condenser-evaporator in which it is partially condensed to give about 98 per cent nitrogen as vapour product and a condensate of just over 40 per cent oxygen. Nitrogen is condensed over a further range

of levels in the column and then subcooled and expanded into the top of the column as reflux. Condensate is expanded in the centre of the column as feed. About 26 per cent of the cooled air is condensed concurrently against the boiling oxygen product in a separate evaporator, the liquid air resulting being used as a reflux at an intermediate level in the column. Just over 20 per cent of the air feed is taken from the nitrogen regenerators, passed through absorbers and expanded through a turbine into the column as additional vapour feed.

The dephlegmator (or fractionating condenser-evaporator) can, ideally, be employed in this cycle. A thermodynamic efficiency of 22 per cent is claimed. Efficiency of the distillation cycle can be further improved, the author notes by subdividing the process of dephlegmation to give further reflux streams at intermediate nitrogen concentrations but these further complications did not appear to be justified. Installation of a small auxilliary column would give 60 per cent of the high purity oxygen product and about 40 per cent at 90 per cent purity. If the oxygen or purified fraction was required under pressure, the liquid product could be compressed in a liquid pump before evaporation.

In a consideration of fractionating devices, Dr. Haselden states that for duties involving partial condensation or evaporation, a new type of distillation device, termed 'overflow' packing, is being developed. It consists of a corrugated packing suitable for incorporation in the brazed plate-type heat exchanger. Preliminary tests with this packing using mixtures such as benzene-acetone have shown values of HTU of about 3 in. combined with very high condensing-film heat transfer coefficients.

Reduction of heat in leak will become increasingly important, it is stated. Reduction can be achieved by restricting large-scale convection currents in the insulation and by shielding any zones of the plant which operate at temperatures near or below the dew point of air.

Dr. Haselden extended his discussion to other multi-component separations. The problems which arise in these are the arrangement of columns for an ideal multi-component separation and the rates of reflux and reboil to be maintained in each column.

Use of liquid propane scrubbing to avoid the lowest temperature levels in the separation of hydrocarbon gas mixtures, particularly when hydrogen was a product, was mentioned. Liquid propane at about —100°C. could replace the upper section of the first column, and provided that the liquid propane was added at a temperature at which its vapour pressure was negligible no irreversibility was involved. An extra column might be necessary to purify the recycle propane.

In his conclusions, Dr. Haselden said that in low temperature distillation it appeared that an overall efficiency of between 15 and 25 per cent should be possible depending on the mixture to be separated. Opportunity for improvement of present-day plants appeared to lie in 'the direction of increased attention to fractionating column irreversibilities, the solution lying partly at least in the use of non-adiabetic distillation devices.'

ECONOMIC PRODUCTION OF AMMONIA SYNTHESIS GAS

THE various features of design of liquid nitrogen scrub plant for purifying a refinery vent gas to produce hydrogen suitable for ammonia synthesis gas were the subject of the paper given by Mr. M. R. Jester ('Economic synthesis gas from petroleum refinery vent gas').

Complexities of design varied in accordance with the composition of the gas to be purified. In low temperature processing, the impurities in petroleum vent gas required special consideration, nevertheless, from an economic standpoint the use of low temperature processing was competitive compared to the various ambient temperature processes for producing ammonia synthesis gas. This viewpoint was substantiated by the trend in new plants in the US where approximately 75 per cent of new plants since 1951 utilise low temperature processing. One US plant was reported to be making synthesis gas for approximately £8 per equivalent ton of synthesis ammonia.

Mr. Jester indicated a typical process adaptable to the average refinery gas which will contain raw hydrogen generally between 70 and 95 per cent pure with hydrocarbons, carbon monoxide, carbon dioxide, hydrogen sulphide and water vapour. This gas is first purified of carbon dioxide and hydrogen sulphide by scrubbing with caustic soda solution at 300 to 400 p.s.i.g. Water vapour is removed in a dessicant type drier employing activated alumina, the gas leaving at a dewpoint of —100°F. The gas is then cooled against product gases from the cold part of the plant and external sources of refrigeration. Certain of the hydrocarbons are thus condensed and this condensate is separated from the main gas stream for recovery as by-product or used as fuel.

The gas is then introduced into the scrub column for scrubbing with liquid nitrogen. Purified hydrogen gas containing some nitrogen is removed from the top of the column. Final impurities in the feed gas, mainly carbon monoxide and methane, are removed in a liquid stream at the bottom. Reduced to a lower pressure and rewarmed against feed gas it generally becomes a part of the fuel gas stream.

Purified hydrogen gas after warming is mixed with sufficient nitrogen to form a 75 per cent hydrogen and 25 per cent nitrogen synthesis gas mixture for ammonia synthesis.

Points of interest in gas cooling dealt with by Mr. Jester were that the condensed liquid fraction, containing also the higher freezing components, must be removed and rewarmed at temperatures warmer than scrub column inlet temperature. To accomplish this, minimum temperature difference must be maintained between inlet feed gas and outlet products at the warm end of the heat exchanger. Before any cooling curve analysis, an overall heat balance for the plant should be made to determine the external refrigeration needs. Feed gas cooling can be found from analysis of the scrub column. For making separations of condensed liquid at certain temperature levels, the composition of the feed gas is required. Use of constant temperature refrigeration in heat exchange with feed gas immediately before making a separation enables temperature control to lend stability to the overall cooling sequence of feed gas. Refrigerants which can be used for this service include ammonia, ethylene, propane, Freon and nitrogen. Having established cooling curves, heat exchanges can then be designed for the plant.

Liquid Nitrogen Scrubbing

Liquid nitrogen scrubbing differs from conventional distillation. These differences have been covered by Ruhemann ('Separation of Gases', 1949, 2nd Edit., Oxford), who has also explained the theoretical procedure for determining the number of contact stages for a nitrogen scrub column for a required impurity removed. The procedure could be limited, said Mr. Jester, to a consideration of the ternary vapour-liquid equilibrium data between hydrogen, nitrogen and the impurity to be removed. For removal of both carbon monoxide and methane from the feed gas, the design of the scrub column should be based on carbon monoxide removal due to the higher vapour pressure of this component at the temepature required at the top of the scrub column. Methane then concentrated in the liquid is removed from the bottom of the column.

Impurity removal from feed gas should be based not on concentration of feed to column, but rather on impurity concentration in the vapour from the first stage after adjustment to equilibrium conditions. The same applied to the last contact stage. The amount of nitrogen to be used in certain contact stages has to be based on overall consideration of the process. In all, design of the scrub column should take into account the most adverse conditions. Operation of the column at as low a temperature as possible is desirable, as impurity removal is then easier and results also in a lesser quantity of liquid nitrogen being required. Overall power needs are thus reduced.

Having established the number of contact stages for the scrub column, the same general concepts required for air separation plant distillation columns can be used.

In conclusion, Mr. Jester said that complexities involved in the process design of a low-temperature processing plant for production of ammonia synthesis gas related directly to the composition of the feed gas to the purified. Economics could not be generalised, but these tended to favour low-temperature processing. Occasionally the economic picture was affected by the desirability of recovery of some components present in feed gas as by-products.

LOW TEMPERATURE SEPARATION OF HYDROCARBONS

SOME aspects of new trends in low temperature gas separation plants were discussed by Mr. Charles C. King in his paper on the 'Low temperature separation of hydrocarbons.' In particular attention was paid to alternative steps, selection of the optimum design and to newer developments in the field.

Low temperature separation, said Mr. King, was particularly adapted to meet the following two requirements: substantially complete recovery of the more valuable components in hydrocarbon mixtures; and the preparation of these components in high purity for subsequent use as chemical intermediates.

A very important consideration in determining the order of the separations was the choice of materials of construction and their cost. Alloy steels were in general use. With the fractionation sequence—depropaniser, demethaniser, de-ethaniser, and C_2 splitter, it was normally possible to use carbon steel everywhere except in the demethaniser and its auxiliaries.

Consideration was then given by Mr. King to each fractionating step and the factors influencing design.

Alumina For Gas Drying

For gas drying in depropanisation, alumina was recommended. Experiments with silica gel had shown it to be unsatisfactory where large quantities of propylene were present because of a tendency to polymerisation and resultant loss of temperature control. Some polymerisation with alumina could and did occur with olefinic materials heavier than propylene, but was not a serious problem in plant operation.

Conditions existing at the top of the secondary depropaniser led to a selection of pressures for the entire depropaniser system. When operating on a gas such as that obtained from naphtha pyrolysis, operating pressures should range from 150 to 250 9 p.s.i. Because of its high content of non-condensibles, refinery gas needed considerably higher pressures. With some gases, even with maximum practical pressures in the range of 500 to 600 p.s.i., the dew point falls into the range requiring the use of alloy steel.

As the demethanising operation is the most difficult and costly, it has been the subject of more variation than any of the other processing steps. In addition to ethylene and propane or propylene as refrigerants or even methane operating in cascade with the ethylene and C_2 refrigeration systems, low temperatures could be obtained by auto-refrigeration if the demethaniser were operated at a pressure higher than that at which tail gas is required. The disadvantages of the auto-refrigeration system lay in the adverse effect on the relative volatility of methane to ethylene and in its inflexibility. However, because it was simpler and less expensive than a separate refrigeration system, the high pressure demethaniser was often more economical, particularly for handling refinery gas. Increased refrigeration could be obtained from the auto-refrigeration system by using an expander machine in place of the Joule-Thompson expansion. Expanders decreased compressor duty and increased recovery of ethylene. It was stated though, that unless the gas going to the expander was superheated, condensation of some liquid could occur resulting in a loss of efficiency.

When operation in the region of liquid condensation was contemplated, radial inflow turbines were not used because of the high loss in efficiency. If it was desired to utilise the power developed by the expander, matching the desired expander speed to that of the machine being driven, created a problem. When power recovery was unimportant an air brake could be used.

Mr. King remarked that many ethylene plants had been built using Joule-Thompson expansion for the lowest temperature refrigeration, but only a few used expander engines. At least one large ethylene plant now under construction in the US was to employ an expander engine on the demethaniser. Use of the expander engine led to yet another difficulty—that of considerable condensation of liquid hydrocarbons inside the engine. As there was some doubt regarding the feasibility of operating an expander under conditions of substantial liquid condensation a more complicated heat exchange system was required.

Water Handling

An important problem in demethaniser design was the handling of water. Although the residual quality of water in the gas was small, it meant that ice would be formed in the demethaniser system. This problem could be overcome by injecting methanol into the system at critical points but such injection led to certain contamination of propylene product and possible contamination of ethylene with an undesirable material. Practical experience had shown that if the demethaniser feed was chilled to a temperature of —145°F. all detectable ice formation in the demethaniser tower itself could be avoided. Then, switching periodically, trouble free operation was obtained. The decision was an economic one between paying for extra feed-chilling equipment and running the risk of a certain amount of trouble with alcohol injection.

Discussing ethylene plants of the low temperature separation type, Mr. King said that these plants have mostly been shell-and-tube heat exchangers which were expensive in the demethaniser system when constructed of stainless steel. Many designs of heat exchangers had been conceived and examples of these included spirally wound tubes and various configurations of corrugated tubes between flat plates. These special heat exchangers could result in large savings in capital cost particularly if full advantage was taken of the potential reduction in plant refrigeration requirements. Ethylene plant operators, however, had been reluctant to accept these units, as there were no mechanical standards to apply to them, there was no way of repairing them and the units could not be cleaned mechanically. These units had, however, been used for many years in the air liquefaction industry and in low temperature gas separation, particularly in Europe. One US firm was to install brazed aluminium heat exchangers in an ethylene plant now under construction.

When operated in conjunction with a high pressure demethaniser, the de-ethaniser feed was available at high pressure without requiring a feed pump. In these circumstances it was economic to run the de-ethaniser at 350 to 400 p.s.i. (as against 250 to 300 p.s.i.). In ethylene-ethane separation, it was advantageous to operate at low pressure. Below —50°F., this advantage was counter-balanced by the high cost of alloy steels. Normally it was found most economic to operate the C_2 splitter in the region of 260 to 280 p.s.i. to obtain the best relative volatility within the limits of propane refrigeration. It was also advantageous to consider the use of a heat-pump to supply the refrigeration requirements. They could reduce compressor horse-power and eliminate an expensive heat-exchanger, condenser or reboiler. One type mentioned by Mr. King (Type A) in comparison with a conventional C_2 splitter, showed an investment advantage of $1.10 per annual ton of ethylene capacity. In the UK there was one plant operating with an A-type heat-pump.

Acetylene Removal

For removal of acetylene from ethylene it was doubtful if a solvent system (using acetone or dimethyl formamide) was economic. Catalytic hydrogenation of acetylene could be conveniently performed on the pyrolysis gas at some point before the demethaniser so that hydrogen contained in the pyrolysis gas was available for the hydrogenation. As less than 10 p.p.m. acetylene were required for the ethylene, a two-stage acetylene-hydrogenation was necessary. The second stage was introduced, therefore, before or after the C_2 splitter, requiring the addition of hydrogen from external sources.

A large portion of the capital cost was devoted to the refrigeration system. In a US study comparing a four-level ethylene refrigeration system with a two-level system, it was found that the four-level system had an investment cost advantage of $0.20 per annual ton of ethylene product in addition to an operating cost advantage of $0.25 per ton of ethylene. Investment cost advantage was brought about by the savings in compressors which more than offset the extra cost of heat exchangers.

Another item for economic study was the design of refrigeration systems temperature approach used in refrigerant evaporators. In a study of temperature approaches, the lower one of 5°F. as against 10°F. was justified since compressor savings, capital and operating, were greater than the increased cost of heat exchangers.

Dealing with compressors, Mr. King said that centrifugal compressors had the

advantage of lower capital cost than reciprocating machines, particularly in the US. Performance records of such machines were so good that spares are not generally installed. Reciprocating machines, however, had a high efficiency and lower fuel costs generally than the centrifugal machines. Two ethylene plants now being constructed in the US and one in Europe were to have large gas-turbines operating several compressors in tandem; these would be the first installations of this kind.

Refrigerants were all hydrocarbons which could be obtained from low temperature gas separation plant. A plant could be started with feed gas and no refrigerants and then gradually the refrigeration systems could be filled with impure materials which would be purified during plant operations.

Firstly, Mr. King considered future designs such as replacement of the methane system by vapour compression and expansion system as used for air liquefaction. In a US commercial system a separation plant employs nitrogen as refrigerant and achieves a temperature of —300°F. while the heat is rejected from the refrigeration system to ammonia at —25°F. without intermediate refrigerants. Such a system would permit elimination of the ethylene refrigeration system in addition to the methane system, with the substitution of a gas expansion compression cycle.

DEVELOPMENTS IN INDUSTRIAL OXYGEN PRODUCTION

NEW techniques and developments being used in the design and construction of modern air separation plants in the US were dealt with by Mr. M. A. Dubbs in his paper on 'Recent developments in industrial oxygen production'.

Mr. Dubbs said that emphasis was on package design to reduce field labour, on improved heat and mass transfer equipment, on the application of automatic controls and on the use of metals new to commercial low temperature application. These innovations had required the solution of new problems in design, erection and operation.

The following were characteristics of basic modern air separation cycles: air compressed to a single low pressure ranging from 60 to 100 p.s.i.g.; the oxygen product is delivered from the separation unit at essentially atmospheric pressure and then compressed to the required pipeline pressure; heat exchange is carried out in reversing heat exchangers or regenerators or a combination of both (no water or CO_2 is removed from the air prior to heat exchange); residual contaminants, such as CO_2 and hydrocarbons in the cold part of the equipment, are removed by extensive use of adsorbents such as silica gel; rectification is performed by a double column system using sieve trays; and refrigeration is supplied either by an expansion turbine or by the addition of liquid oxygen to the column.

Linde plants operate at head pressures of 60 to 100 p.s.i.g. For these pressures the centrifugal air compressor is the most economical type and for volumes above 600,000 cu. ft./hr. The use of water injection or inter-cooling after each wheel leads to values of adiabetic efficiency of from 70 to 75 per cent for these volumes. For capacities in excess of 3.5 million cu. ft./hr., axial flow compressors are sometimes used. For air volumes of 400,000 cu. ft./hr. and less, reciprocating compressors are used, but it is suggested that improvements in centrifugal compressor design might alter this practice.

In considering heat and mass transfer equipment, Mr. Dubbs stated that present-day regenerators, with imbedded coils using cheap packing, had proved economical for high purity oxygen production, but posed interesting design problems. In separating columns, sieve-trays were still preferred over bubble-caps for low-temperature service. Hydraulic losses remained an important factor in tray design, especially in the larger tray sizes. The problem of completely cleaning the air in the plants remained important. To protect the main condenser adsorbents such as silica gel were used.

Instrumentation was an important feature of the modern plant. The number and type of controls required depended on plant size and complexity. Controls were provided for three liquid levels—at the bottom of the high pressure column, on the oxygen side of the condenser-reboiler, and in a nitrogen-reflux-liquid measuring pot at the top of the low-pressure column. Several flows are also controlled, such as the amount of side bleed air from the regenerator and quantity of air through the turbine. Turbine exhaust temperature is controlled. To ensure product purity an analyser-controller is provided.

Instrument Air Supply

Cleanliness and reliability of the instrument air supply is important. Process monitors are provided for items which would normally be observed by the operators. These are connected into an annunciator panel to provide visual indication of their activation.

For insulation of low temperature plants, a powder-type insulation is stated to offer considerable advantage over wool. Recent plants use an expanded perlite with a packed density of approximately 10 lb./cu. ft. It has a thermal conductivity of about 0.018 B.Th.U./hr. sq. ft. °F.St. and a relatively low specific heat of 0.2 B. Th.U./lb.

Various materials of construction are being used in fabricating low temperature equipment, but Mr. Dubbs stressed the extensive use in the US in recent years of aluminium since the metal has approximately one-third the density of the copper and yet costs about the same per lb. (in the US). In spite of its lower strength it is cheaper, too, than stainless steel. The most frequently used aluminium alloys in low temperature work were described. These were (US Aluminium Association designations) 3003 for small diameter piping and general metal sheet work, 6061 for structural members and 5154 for pressure vessels and large diameter thin wall pipe. Welding aluminium in Linde's factories is carried out using argon shielded arcs.

Another metal of interest to the low temperature industry was 9 per cent nickel steel, SA-353. It has 20 per cent higher strength at approximately two-thirds the cost per lb. of previously used 18-8 stainless steel. However, finished pressure vessels have to be stress relieved at 1,025°F. to 1,085°F. after welding to restore the low temperature properties in the weld zones.

Nevertheless, stainless steel is still frequently used in low temperature plants because of its high strength, excellent welding characteristics, and low temperature ductility. By virtue of its relatively low thermal conductivity, it is used for extended stem valves, equipment supports, and piping of major lines between low temperature equipment and warm casings.

Summaries of other papers presented at this symposium will be reported in "Chemical Age" next week.

Changed Status of RIC Qualifications

CHANGES in the Royal Institute of Chemistry's regulations for admission to membership are explained in an information leaflet issued by the institute.

Under the new regulations now in force a candidate who fulfils the general qualifications previously required for the associateship now qualifies only for admission to graduate membership. Although purely a transitional non-corporate grade, graduate membership should be accepted for all purposes for which the associateship or the equivalent of a good honours degree in chemistry was formerly specified.

For admission to the associateship evidence must be given of at least two years' approved experience since admission to graduate membership. Associateship now connotes therefore not only a qualification equivalent to a good honours degree but also a period of approved experience in practice.

Fellowships are open to well-qualified chemists of established repute who have attained a high level of professional maturity and responsibility.

The former examinations for the fellowship have been replaced by examinations of the same standard leading to the institute's Diploma in Applied Chemistry.

The leaflet goes on to discuss the relationship between university degrees, college diplomas and the institute's qualifications. A 1st or 2nd class honours degree in chemistry will exempt from the whole of the graduate membership examination. A pass degree, or an honours degree below 2nd class, will only exempt from part of the graduate examination.

New Manchester Course

A course of 12 lectures on 'Recent advances in the chemistry of cellulose and starch' will be held on Fridays starting 10 January at Manchester University. The course has been arranged by the College of Science and Technology in collaboration with the university's chemistry department

WEST GERMAN PRACTICE IN HANDLING EFFLUENTS

FBI Mission's Visit to Chemical Works

THE tendency in Western Germany for chemical plants to tackle problems of effluent disposal by segregating and treating the waste material at or near the source was noted by the eleven-man delegation that visited Germany last year, under the auspices of the Federation of British Industries.

Several examples were also seen of the economic use of a waste chemical after segregation and recovery. The team found much which indicated that the Germans have put an enormous effort into the re-establishment of their water supply and drainage facilities since the end of the war and that their future plans were on a similar scale.

The party, led by Dr. C. J. Jackson, Distillers Co., visited chemical works, lignite mines, steel works and installations of various river associations and water authorities in the heavily industrialised area surrounding the Ruhr, Emscher and Lippe rivers. Their report has just been published, and is available from the FBI at 21 Tothill Street, London SW1, price 3s 6d.

As well as Dr. Jackson, the party comprised Mr. W. Etheridge, Courtaulds, Mr. Hewson, ICI, Mr. J. W. Hunt, British Paper and Board Industry Research Ass., Mr. K. Kearsey, FBI, Mr. G. T. King, ABCM, Mr. D. H. Paines, British Celanese, Mr. T. Waldmeyer, Albert Reed Ltd., and Mr. E. Wallis, Imperial Smelting Corporation. The delegation was joined by Mr. E. L. Streatfield of Houseman and Thompson at the invitation of the Bundesverband der Deutschen Industrie. The chemical plants visited were the two factories of Farbenfabriken Bayer, at Dormagen and Leverkusen, and the works of Chemische Werke Hüls, AG Marl, Krs. Recklinghausen.

Particularly Impressed

The delegation were particularly impressed with the work and achievements of river and water associations, which over the past fifty years have demonstrated that industry and local authorities working in co-operation, can provide systems of water supply and effluent disposal to meet the needs of a rapidly expanding industry. In Germany these associations combine certain functions of a number of statutory authorities in Great Britain, such as local authorities, water authorities and river boards. Through the agency of the associations comprehensive schemes for water conservation, land drainage and effluent purification have been devised and paid for on a joint basis, all finance having been provided by the interested parties without Government grants. Industry's contribution to the total expenditure has been very heavy, of the order of 30 per cent of the overall cost of the Emscher river area.

As an example of the scale of expenditure involved, it was noted that the Emscher River Association over 50 years has spent between £40 million and £50 million on drainage works and the treatment of effluents. During the next seven years the association has budgeted to spend £5 million on the construction of additional effluent treatment plants alone.

A visit was made to Farbenfabriken Bayer AG to inspect a plant treating waste water from the cuprammonium spinning process for recovery of copper in the 'blue water' (ammoniacal wash water of the immediately spun fibre) and waste acid water (spinning acid). Copper content of 'blue water' is 80–200 p.p.m. and for the acid, 8,000–16,000 p.p.m. Ammonia content of the blue water is nil and 12–16 g. per litre for the acid.

Potential copper loss from the process in these waste waters is about 25 tons a day. The recovery process employed by Bayer is one of ion exchange, using a synthetic resin as exchange material, Lewatit, D.N. 150, produced at the Leverkusen works. Blue water is passed through a number of parallel vessels filled with the exchange material, which absorbs the copper ions.

Strong Copper Solution

Strong copper solution is obtained by washing the exchange resin with waste spinning acid. Precipitation of the solution's copper content is carried out in two stirred vessels connected in cascade. In the first 25 per cent ammonia solution is added, precipitating the bulk of the copper. In the second vessel, sufficient ammonia is added to adjust the pH to 7.0. As the supernatant liquid from precipitation still contains about 0.1 g. per litre of copper, this is also passed through another ion exchange unit.

The copper precipitated is removed from the filter as a fairly dry cake (35 per cent copper content) and is dissolved for re-circulation to the process.

The exchange material can be used and regenerated satisfactorily about 150 times.

In excess of this, the material begins to give trouble with blockage due to swelling of the granules, and copper removal efficiency falls off.

The exchange units, which have been in operation for 10 years, consist of a series of vessels constructed of rubber-lined steel 10 ft. in diameter by 20 ft. high with 1,430 cu. ft. capacity. Each container has 1,060 cu. ft. of ion-exchange material of 40 per cent granules 0.3 to 1.0 mm. and 60 per cent 1 to 2 mm. Height of the bed is 14 ft.

Normal throughput rate	55,000 g.p.h.
Total volume of copper-containing water per run	3.08 m.g.
Copper absorbed per cu. yd. of base exchange material	4.4 tons

At the Leverkusen works, the large plant for economic recovery of iron oxide from copperas was inspected. This is installed next to the sulphuric acid works to utilise the recovered sulphur dioxide for acid manufacture.

Copperas crystals are received from two sources, one from titanium oxide manufacture and the other from nearby pickling plants. The crystals go direct from transport vehicles to an underground hopper.

There are two stages in the recovery process. In the first, dehydration of iron sulphate heptahydrate ($FeSO_4.7H_2O$) to monohydrate ($FeSO_4.H_2O$) is carried out in two fluidised bed furnaces of Bayer's own design, using fuel oil. In the second stage, monohydrate ($FeSO_4.H_2O$) is converted to $Fe_2O_3 + SO_2$ by roasting in Herreschoff multiple hearth furnaces located on the acid plant. Strong SO_2 gas is produced and the final oxide is in fine powder form. Throughput of this plant was stated to be 120,000 tons of ferrous sulphate heptahydrate. As the sulphur content of the iron oxide is 0.2 to 1.2 per cent, it can be used directly in a Siemens Marten furnace.

The wide variety of processes carried out at works of Chemische Werke Hüls AG, produces a real problem in effluent disposal. Waste waters from the different processes vary greatly in composition and for some no methods of treatment have been developed. Difficult impurities include butadiene, croton aldehyde, hydrocyanic acid, aldehydes, ketones, alcohols and esters. Other effluents contain undissolved solid products such as barium sulphate, calcium carbonate, scrap buna, carbon black and complex organic condensation products. Some have undissolved materials such as tar residues or soluble inorganic compounds such as sodium or calcium chloride, sulphides and mineral acids.

'Individual' Treatment

Control and purification of individual effluents at the various plants is the aim for which a variety of methods are used: e.g. activated carbon absorption treatment for butyl acetate plant effluent; reduction of chlorinated aldehydes by blowing in a stripping tower; filtration of butadiene waste waters through flue ash to remove colour and odour and reduce the permanganate demand. Waste waters containing styrene are treated with carbon and lime. Combined treatment of butadiene and styrene waste waters in this way is more rapid in action than separate treatment. This same treatment is also used for waste waters containing croton aldehyde and butyric aldehyde.

After the main purification of effluents at the individual plants, combined process waste water is passed to sedimentation tanks where the bulk of settleable impurities is removed, and then to the main collecting basin. Sludge is pumped from the tanks to drying lagoons and mixed with ashes from the boiler plant.

Clarified effluent is pumped (at 50 to 70 p.s.i.) through spray nozzles, mixing with waste cooling water. Traces of volatile organic impurities are eliminated by the spraying and adequate aeration is ensured. Aquatic plants cultivated in the lagoon act as indicators of final effluent

purity and assist in photosynthetic oxygenation. The treated process water diluted with power station cooling water is discharged to the Lippe River.

There is separate collection of cooling and process effluents with a stoneware line for contaminated liquors and a concrete drain for cooling water and rain water. Water quantities involved are: potable water 110,000 g.p.h., river water 3.3 to 3.75 mg./hr. and process water 330,000 g.p.h.

Control of effluents is carried out by a chemist assisted by a biologist and a staff of 20. The control laboratory contains recording instruments indicating quality of water at all stages. The section can take up any question of non-conformation of individual plant effluent with the manager concerned. A small laboratory is also maintained at the point of junction of the effluent with the Lippe River. As a biological control of effluent quality, goldfish and Lippe fish are kept in flowing mixtures of river water with works effluent in various proportions, and observations are made on their behaviour.

Phenol Extraction

The delegation inspected a phenol extraction plant built in 1950 on the coke plant of the Mathias Stinnes Colliery. Here the ammoniacal liquor is first freed as far as possible from tar and oily impurities by passing through a standing column of benzol. This absorbs the impurities and is replaced as necessary. The clarified liquor is then pumped to the top of the phenol washer, a tower fitted with Raschig rings, where it meets an upward flowing stream of benzol. The dephenolated liquor flows to a gravity separator, where any benzol carried over settles out, and then passes to the ammonia plant. The benzol enriched with phenol overflows through a separator to remove entrained liquor, to the soda washers containing 30 per cent soda solution. The benzol phenol solution enters at the bottom, leaves at the top and passes similarly through the second washer. When the first washer is saturated it is cut out of the system and the sodium phenolate run to storage. It is then filled with fresh soda and connected up as the second washer. The phenol-free benzol passes to a separator and returns to the system. It is claimed that this plant was economic at present prices when treating a liquor containing more than 0.1 g./100 c.c. of phenol.

The party found that a special task of the Emscher River Association has been the treatment and disposal of coke oven effluents. It was found that phenol contained in the spent ammoniacal liquor discharged to the Emscher, tainted salmon in the Rhine and gave an unpleasant taste to drinking water which had been chlorinated. Since 1950 the number of recovery plants has been doubled and these plants now effect more than a 70 per cent reduction in the amount of phenol discharged, from 6,700 to 1,970 metric tons a year. In 1955 about 5,360 tons of phenol and cresol were produced from crude coke works liquor.

In a typical composition of ammoniacal liquor the phenol content was about 2,000 p.p.m. The proportion of the individual phenolic constituents varied within the following ranges:

Phenol	50–53 per cent
o-Cresol	14–17 per cent
m-Cresol	13–16 per cent
p-Cresol	8–10 per cent
Xylenol	2–5 per cent

There are also small quantities of polyhydric phenols and neutral oils. Three or four years ago the average phenol content of ammoniacal liquor was 3,000/4,000 p.p.m. with a coking temperature of 900/1,100°C. and a coking time of 24/26 hours. In order to increase the output of coke the temperature was raised to 1,200/1,300°C. and the coking time lowered to 18/20 hours. The higher temperature has had the effect of reducing considerably the amount of phenol in the ammoniacal liquor. Operating costs were £68 per ton of phenol produced and receipts from sales £85 to £93 per ton of phenol.

There were no signs of foaming in the Emscher as might be expected if synthetic detergents were used. The team learned that synthetic detergents were not used in Germany to the same extent as in this country and in consequence problems such as those met with in Britain are not experienced.

TWO WELSH PLANTS CONVERT METHANE TO TOWN'S GAS

CONSUMERS served by the North Wales gas grid, opened by Prince Philip on 28 November, now receive part of their gas from a unique supply of methane produced by the mine drainage system at Point of Ayr colliery, near Prestatyn. The almost pure methane from the colliery is reformed into normal town's gas by plant designed and built for the Wales Gas Board by Humphreys and Glasgow Ltd. on reclaimed marshland bordering the Dee estuary.

The Humphreys and Glasgow installation comprises two separate units, using different methods to reform the methane.

One is a catalytic plant which is capable of reforming up to 1 million cu. ft. of methane a day, yielding about 1,750,000 cu. ft. of town's gas (of a value of 500 B.Th.U.s) a day. The plant is designed so that it could be used if necessary to make town's gas from oil instead of methane.

This plant uses the Onia Gegi cyclic process, in which oil or hydrocarbon gases are cracked in the presence of a catalyst at temperatures of 900°C. to 1,000°C. This reaction consumes heat, and it is necessary periodically to stop gas-making and heat the catalyst by burning oil or gas and passing the hot combusted gases through the catalyst. A cycle of about six minutes is normal, heating and gas-making each occupying approximately 50 per cent of the time.

The plant has four main vessels interconnected:

1. Combustion chamber, consisting of a vertical cylindrical steel vessel with refractory lining and fired by an undershot burner.
2. Reactor vessel consisting also of a vertical cylindrical steel vessel with refractory lining and containing catalyst supported on a refractory sole plate.
3. Horizontal fire tube waste heat boiler to recover heat from the waste gas during the heating phase of the cycle. The boiler is designed for a maximum safety valve loading of 125 p.s.i.g.
4. Steel wash box with inlet dip pipe sealed in water and hopper bottom for easy cleaning. This apparatus permits gas flow forward but seals off the gas mains and holder during the heating phase of the cycle.

Cyclic operation of the process is carried out by the Humphreys and Glasgow mechanical operator which automatically works all the cyclic valve changes in safe and proper sequence. Ancillary plant comprises gas scrubber with wood grid filling, and naphthalene washer for use when gasifying oil.

The second unit, a carburetted water gas plant, has a dual purpose in that it can be used for making blue water gas from coke or suitable coal or mixtures of both, this gas being used to dilute the methane to town's gas quality (output up to 1,750,000 cu. ft. of town's gas a day); or alternatively to crack the methane thermally, with an efficiency equal to that of the catalytic process, by passing it through the hot zone of the fuel bed (output up to 1,250,000 cu. ft. of town's gas a day). Even when reforming it is necessary, however, to consume some coke in order to maintain the correct cracking temperature.

This plant also has four main vessels interconnected:

1. Generator of vertical cylindrical steel construction with refractory lining and iron grate, top charging door, lower clinker and ash removal doors, blast inlets, gas offtake, etc.
2. Carburetter of similar cylindrical steel construction with refractory lining and filling of refractory checker bricks, oil sprayer, gas inlet and outlet, etc.
3. Horizontal fire tube waste heat boiler to recover heat from the waste gas during the heating phase of the cycle. The boiler is designed for a maximum safety valve loading of 125 p.s.i.g.
4. The normal type of wash box is provided with this plant. The water gas plant employs the same system of automatic operation as the catalytic plant, and controls and instruments are similar.

Apparatus and Techniques Exhibition

AN exhibition of laboratory apparatus and techniques at which 34 firms will be showing is to be held at the College of Science and Technology, Sackville Street, Manchester, on 18 and 19 December. Organisers are the Royal Institute of Chemistry, Manchester and district branch.

Scientific glassblowing will be demonstrated and a wide range of equipment will be shown, including balances, centrifuges, electronic equipment, laboratory ovens, furnaces and scientific optical equipment. A representative selection of modern laboratory techniques will be demonstrated using the latest equipment.

HEALTH HAZARDS AND NEW SUBSTANCES

ICI's Work to Minimise Dangers

ICI medical officers are experienced in the handling of many chemical hazards, but when a new process is considered or a new substance is provided they require new information. This was stated by Dr. C. M. Scott in his paper, 'Fundamental health problems and how ICI deal with some of them,' presented recently at a one-day conference held in Chester. The subject of the conference was Safety, and it was organised for the benefit of senior management. All ICI divisions were represented and among those attending were Sir George Barnett, Chief Inspector of Factories, Dr. W. H. Garrett, director Monsanto Chemicals Ltd., Mr. R. A. Banks, ICI personnel director, Dr. R. Beeching, ICI technical director, and Mr. H. R. Payne, head of ICI safety department.

Dr. Scott said that the new information required to meet hazards occasioned by new processes or new substances sometimes appeared in the form of a skin eruption or even worse, an accident, but these were rare. At the earliest moment the new substance was sent to the Industrial Hygiene Research Laboratory (IHRL) where its toxic properties were measured and where the nature of its possible or probable effects on man was forecast.

Substance Evaluation

The laboratories were recognised by the Home Office as suitable for work on animals to evaluate poisons and the staff was licensed to carry out vivisection experiments. When a new substance was submitted to the IHRL, the first procedure was usually to administer it to a group of rats, and the estimation of the potency of a poison was carried out statistically, the usual measure being the LD50.

The lethal action was only one measure of the harm that could be done. For instance, chemical substances that had a relatively low toxicity like paraphenylenediamine were notorious causes of eczema. Some poisons selected the nervous system and short of killing could produce permanent paralysis, e.g. the organic mercurial compounds used as fungicides. In general the symptoms and signs of injury seen in animals ran parallel to those that occurred in man. β-Naphthylamine produced tumours in the bladder of man as it did in the dog's bladder. Nevertheless this substance did not produce a tumour in the rat and here was an example of the species differences in reaction. In general, however, the animal experiments gave a reasonable indication of what effects were likely in man.

Dr. Scott declared: 'In our own company the value of animal experiments can be assessed by the fact that no unforeseen accidental poisoning has occurred as a result of misleading animal experiment. In pharmaceutical division, the invention of new drugs depends entirely on animal experiments. Finally a stage is reached when it is decided to use the new drug on man. . . . In about a hundred such trials on man, often involving thousands of patients, I do not recollect a single simple accident that could be ascribed to a misleading animal experiment, and in about a quarter of them the animal and human reactions were so similar that new drugs were in fact introduced into medicine.

'So the IHRL examines the action of chemicals on rats, mice, monkeys and rabbits and interprets the results in human terms. Safety precautions are suggested and sometimes suggestions for the treatment of poisoning if it occurs. These recommendations and suggestions are sent to medical officers, safety officers and so on in the divisions who base their practical measures on them.'

Fundamental Inquiries

In addition, more fundamental inquiries into the mode of action of chemical substances on living matter are pursued. For instance it was desirable to know what happens in the body to food colours. Laborious analytical experiments are being carried out to try to make a balance sheet of a food colour taken by mouth, what comes out in the urine and faeces unchanged, where some of it is metabolised and what are the breakdown products.

'Another kind of investigation upon which we are embarking concerns carcinogenicity. Some chemical substances are known to be carcinogenic, e.g. β-naphthylamine. But the number of substances of proved carcinogenicity in man are very few; the number suspected, however, is large. The difficulty for us is that animal experiments have not been sufficiently standardized. Some animals, in my opinion the rat is notorious, react to an injury by producing a tumour in a manner that would never happen in man. For instance polymers of all kinds implanted under a rat's skin produce malignant tumours if the implant is in the shape of a disc. If the disc is perforated tumours are much less readily produced, and if the polymer is in powder form no tumour is produced.

'These facts throw doubt on the significance of much experimental work concerned with the identification of carcinogenic substances. Apparently these experiments demonstrate a mechanical factor, not a chemical factor, in tumour formation. But we are concerned with the nature of chemical carcinogenesis and are trying to establish reliable methods of identifying substances that present this particular hazard.'

Other papers on safety aspects were presented as follows: 'The role of Government in accident prevention,' by Sir George Barnett; 'Safety organisation and its effect on works relations,' by Dr. W. H. Garrett; 'Some new developments to be watched—radiation safety,' by Mr. G. G. Sutherland (ICI); 'What works managers think about safety,' by Dr. I. J. Faulkner (works manager, ammonia works, ICI Billingham division); 'What a works manager thinks about safety,' by Mr. J. C. A. Chivers (Dalton works manager, ICI dyestuffs division); 'What the law says about safety in factories,' by Miss M. J. E. Sturgeon (ICI).

The conference was followed by a visit to the Ruabon factory of Monsanto Chemicals Ltd.

Data on Crystalline Boron Issued

PHYSICAL characteristics, chemical properties and analysis of crystalline boron are contained in a data sheet (No. 5-B) published by Borax Consolidated Ltd., Borax House, Carlisle Place, London SW1. The company announced in July this year that they were marketing crystalline boron in the pure state. The following table shows the properties claimed for the grades manufactured.

	Type 1	Type 2
Form	Opaque hard irregular lumps or powder	Fine powder
Colour	Dark grey with high lustre	Dark grey
Particle size	(a) $\frac{1}{4}$ to $\frac{1}{2}$ in. (b) —4 to +18 BSS (c) —18 to +100 BSS (d) —100 BSS	1 to 3 microns

Typical chemical analyses

Boron	99.15 per cent	99.6 per cent
Magnesium	0.42 ,, ,,	Not more than trace
Aluminium	0.14 ,, ,,	Not more than trace
Manganese	0.13 ,, ,,	Not more than trace
Iron	0.11 ,, ,,	0.2 per cent max.
Silicon	0.05 ,, ,,	0.2 per cent max.
Oxygen	—	0.07 per cent (0.1 per cent max.)
Hydrogen	—	0.02 per cent (0.05 per cent max.)

Unlike amorphous boron, also manufactured by Borax Consolidated, crystalline boron is not hygroscopic. It is resistant to oxidation in air. The company believe that this is the first time that boron of this purity has been offered for sale.

Producing Town Gas from Methanol

THE possibility of production of town gas from methanol and light distillates of petroleum is described in a paper presented at the autumn meeting of the Institution of Gas Engineers on 19 and 20 November. The authors were Dr. R. G. Cockerham and G. Percival of the Gas Council's Midlands Research Station.

Laboratory experiments have shown the possibility of producing town gas from methanol by a catalytic process. In considering the gasification of methanol it was realised that although there need be no provision for the removal of tar and sulphur compounds it would be necessary at some stage to reject carbon dioxide.

Washing with hot potassium carbonate would probably be chosen because of its low power consumption.

The five main plant components visualised would be: methanol vaporiser, reaction vessel, boiler, carbon dioxide washer and final cooler. Maximum temperature developed in the reaction vessel would not be likely to exceed 700 °C.

SALES OF BO CHEMICALS UP BY 40 PER CENT

AN increase of more than 40 per cent in the turnover sold by British Oxygen Chemicals Ltd. for the year ended 1 October was reported by Dr. R. F. Goldstein, managing director, at a lunch in Brown's Hotel, London, last week. This figure covered the company's main products: dicyandiamide, melamine, vinyl acetate and polyvinyl acetate emulsions. The increase was spread over both home and export markets. Dr. Goldstein added that margins were less than in 1956.

One of their principal products was melamine, used almost wholly in thermosetting resins. The spectacular post-war growth of thermoplastic resins has led to some people thinking that thermosetting resins were static. This was not so, as study of UK statistics of urea resin production showed. So far as the company's own sales of melamine were concerned, they were twice what they were three years ago.

In Germany, the principal German maker announced a 60 per cent increase in melamine sales in 1955 compared with 1954, and a further increase of 42 per cent in 1956 over 1955, an expansion of two and a quarter times in two years. In Japan, production of melamine resins started only a few years ago; it had reached 4,000 tons in 1956 and was expected to double by 1960. In the US, there was a 30 per cent increase in 1955 over 1954, though the rate of increase had slowed down since.

The bulk of BOC products were utilised in the plastics industry, one of the fastest growing sectors of British industry, which had shown a rapid growth rate since the war. Dr. Goldstein was sure that one of the factors responsible for its expansion was the 'do-it-yourself' movement. In this field melamine ended up as decorative laminates familiar under the trade names Formica, Warerite, etc. Polyvinylacetate emulsions were used both in emulsion paints, where they had taken part of the domestic market formerly held by oil paints and by distemper, and in many types of home adhesives. P.v.a. emulsions had shown a growth rate of 25 times in the last nine years.

Sales by the chemicals subsidiary represented 5 per cent of the British Oxygen group turnover; the greatest proportion of BOC sales was accounted for by melamine.

Referring to the effect of the European free trade area, Dr. Goldstein declared 'We welcome it as a spur and a challenge. The stimulus to the expansion of the use of new materials of industry, to which we contribute as suppliers of some of the starting materials, will, it is hoped, in the long run offset temporary difficulties.'

Turning to the immediate future, he said 'The course of the plastics industry, to which we are geared, is one of leaps and rebounds. Each peak is higher than the one before, the smoothed curve being upwards. While there are many difficulties facing us in the coming year, I look forward to the future as one of progress'.

Ion-Exchange Procedures Discussed at SAC Meeting

ION-EXCHANGE chromatography and trace element determinations were presented and discussed at an ordinary meeting of the North of England section of the Society for Analytical Chemistry on 13 November last at the College of Further Education, Widnes. The chair was taken by the chairman of the section, A. N. Leather, B.Sc., F.R.I.C.

Mr. D. Logie (Imperial Chemical Industries Ltd.) spoke on 'Ion exchange chromatography applied to closely-related organic compounds'. His paper was confined to the analysis of mixtures of chlorophenols. He said that the ion exchange system employed comprised the strongly basic anion exchange resin Deacidite FF (acetate form) with a non-acqueous solvent medium of pure methanol. The separation of the phenols was achieved either by graded elution with glacial acetic acid-methanol or by controlled pH of the eluting medium using triethylamine-acetic acid-methanol buffer solutions. Ultra-violet absorption measurements were employed for the detection and determination of the separated phenols.

In his second paper on 'Trace element determinations with the aid of ion exchange membranes' Mr. Logie drew attention to the value of ion-exchange membranes in micro-analytical work. Particular reference was made to the determination of traces of boron in sodium metal.

A party of members visited the research department laboratories of ICI Ltd., general chemicals division, Widnes, prior to the meeting.

Slime Prevention in Paper Mills

PREVENTION of slime in a paper mill's water system by the use of Panacide is described in a booklet published by British Drug Houses Ltd., Poole, Dorset. Panacide, a brand of chlorophen, forms a highly soluble monosodium salt and is used in paper mills as a 40 per cent aqueous solution of this salt.

Slime accretions are found to be mainly fungal in character, though algae are not uncommon and bacteria are found in some cases. Dosage technique, it is emphasised, will depend on the experience of the responsible technologist at the mill, but trials have shown that the shock dose is more economical than the continuous, both in labour and materials. About 1 to 1½ ounces of Panacide is said to be required for every ton of pulp processed.

Saturday Lectures on Microchemical Methods

A COURSE on semi-micro and micro methods in chemistry is to be held at the Norwood Technical College, Knights Hill, London SE27. Starting on 11 January 1958, on Saturdays between 9.15 a.m. and 12.30 p.m., the 12 lectures will survey the principal branches of chemistry in which small-scale methods have been successfully applied.

The course is considered suitable for teachers wishing to introduce modern techniques into advanced and scholarship level and degree courses. A considerable amount of demonstration work will be carried out.

Organotin Research at Frankfurt Meeting

AN international conference of scientists and industrialists from Europe and America meeting in Frankfurt last week were told of the almost limitless possibilities for industrial and agricultural uses of organotin compounds.

Dr. E. S. Hedges, director of the International Tin Research Council, opening the conference, described how organotin research, sponsored by the Tin Research Institute in England, Holland and France, was spreading throughout the world of its own volition. He said that this branch of chemistry was already of great commercial interest with a number of manufacturers of organotin compounds now in production and developing new markets for their products, both in Europe and in America.

Organotin compounds are already employed in paper, plastics, textiles, paints and veterinary medicines and their uses for other industrial applications are likely to spread widely and rapidly.

Dr. Hedges paid a tribute to Professor G. J. M. van der Kerk, organic chemist to the Netherlands Government, who, at his laboratories at Utrecht, working in conjunction with the institute, had made many major contributions to the science of organotin chemistry.

Five papers were presented at the conference. Professor van der Kerk surveyed in great detail recent results of organotin research.

The application of organotin compounds as stabilisers for p.v.c. were described by Dr. H. H. von Reuss of the Deutsche Advance Produktion.

Dr. K. Hartel, Farbwerke Hoechst, spoke on the application of organotin compounds in agriculture, while the pharmacology of organotin compounds was discussed by Professor O. Klimmer, Bonn University.

The meeting ended with a paper on the use of organotin compounds as wood preservatives read by Dr.-Ing. B. Keysellitz, head of the Tin Research Institute's German office, which organised the conference.

British Geon Employee Loses Damages Action

AN employee of British Geon Ltd., Sully, Glamorgan, failed in his claim for damages for personal injuries against the company. In a three-day action at Glamorgan assizes it was alleged on behalf of the employee, David William Davies, who began working for the company in 1949, that in December 1951 he was given the job of mixing and reacting certain chemicals, and continued to do so until July 1953 when he contracted a skin disease.

For the job Davies had to work in a room 14 ft. by 12 ft. with very little headroom. He wore protective clothing which included rubber gloves and a shield for his face.

Mr. Justice Finnemore said Davies could have contracted dermatitis even though his employers had taken reasonable precautions. He was satisfied that the company took every precaution and did everything for the welfare of their employees.

Overseas News

LARGE DUTCH SODA ASH PLANT ON STREAM BY END OF 1957

LARGE units for the production of soda ash, vacuum salt and electrolysis are being built by the Royal Dutch Salt Industry Ltd. in the eastern part of Holland where there are large salt deposits. As announced in CHEMICAL AGE, 23 November, p. 854, the soda ash plant now under construction on the coast at Delfzijl will come into operation at the end of this year. This large-scale plant called for the investment of Hfl. 51 million (£5 million).

It is being built for the Dutch Soda Ash Co. Ltd., the management of which is in the hands of Royal Dutch Salt Industry, Mauritskade 63, Amsterdam. The modern installations have been engineered in co-operation with a US soda ash producer, the Diamond Alkali Co. Construction started in 1955 and as a first step 1,500 piles were driven into the soft clay to form a firm foundation; the piles varied in length from 21 to 75 ft.

A relatively cheap product, soda ash can only bear low freight charges and good transport facilities were essential. Delfzijl is a sea port as well as a canal port; in addition the plant is connected with the Dutch railways system and has a private siding.

A large salt dome was located at Winschoten, near Delfzijl, in 1952, a discovery that led to the decision to build the soda ash factory. The dome is a large one, its height being more than 3,000 ft., the top lying at a depth of about 1,200 ft. below sea-level. The salt is recovered by underground leaching. The brine is pumped from Winschoten through a 12-in. pipeline to a brine-basin near the Delfzijl plant, over a distance of about 16 miles.

The Royal Dutch Salt Industry are also constructing an electrolysis plant adjacent to the soda ash factory. In addition, a vacuum salt installation is to be built. When this work is completed, the site will combine plants consuming steam (soda ash and vacuum salt) and power (electrolysis).

Shell's Solvent Plans

Construction of additional facilities for solvent manufacture at an estimated cost of $600,000 at Shell of Canada's Shellburn refinery, near Vancouver, have been announced by Shell's refinery manager, Mr. G. A. Lorenz.

Belgium's Chemical Industry Recovered in September

The recovery anticipated for September occurred in the Belgian chemical industry. It was somewhat less noticeable than in the same month of the previous year.

Activity has been maintained in the majority of sectors, with well-filled order books and the assurance of a maintained level of activity for some months hence.

There were hopes for a distribution of French licences permitting the recovery of Belgium exports in this sector. In Finland, monetary difficulties have resulted in a reduction of imports. Persisting slackness in freighters has favoured the restocking of raw materials and fuels. The F.O.B. price of US sulphur has fallen by $3 a ton under the previous price.

For the first time, the average level of prices for basic raw materials is under the average level for 1955.

Production of nitrogen fertilisers has regained its normal level thanks to the freeing of exports to China. Sulphuric acid production has also been favourably influenced by resumption of trade with China, and as a whole, the inorganic and organic chemistry sectors have remained firm. There has also been a good market for tar derivatives. The low demand for agglomerates, particularly of the small variety, has influenced to some extent the supply of tar.

The pharmaceutical industry showed renewed activity. Gelatines, dyestuffs, plastics and photographic products have all shown sustained activity.

Cobalt Plant at Ndola Commissioned

Chibuluma Mines Ltd. have now commissioned the first stage of their cobalt plant at Ndola. In this plant concentrates are converted to matte. Arrangements have been made for this matte to be treated in Belgium and the returnable cobalt metal will be used to repay in part the company's loan from the US Government.

The company are considering the question of completing stage two of the cobalt plant, which should enable them, in due course, to produce their own cobalt metal, thus avoiding shipment of matte overseas.

Stage one of the cobalt plant has already cost more than the original estimates and stage two would involve further capital expenditure. Future capital expenditure will be considered in the light of the company's assessment of the future of the cobalt market.

Dutch Prospects for Pesticide Imports

Market prospects for some well-known pesticides in Holland have been published by the Board of Trade, export services branch. They are:

Ammonium sulphate and ammonium thiocyanate; Not used. Not selective enough: *Dinosam and dinoseb;* Used on flax, pulses, etc. *DNHP* is the commonest and is cheaper: *MCPA;* Very important. Used to a great extent on cereals, grass, etc.: *Monuron;* Not selective. Du Pont believed to have a virtual monopoly: *Cupric chloride;* No longer used: *Dinex + dichloralurea;* Not used: 2, 4-*D;* Unimportant: *DNC;* Used a great deal. Produced locally in large quantities at competitive prices. Little scope for imports: *Maleic hydrazide;* Not approved: 1-*Naphthylacetic acid;* Negligible importance: *Pentachlorophenol;* Used on bulbs and for pre-emergent spraying: *Phenylmercury acetate;* Not of great importance: *Propham;* None imported: *Sodium chlorate;* Imported mainly from France and East Germany: *Proxan-sodium;* Not approved: *Trichloroacetic acid;* Imported almost entirely from Germany: 2, 4, 5-*T;* Formulated locally by several firms.

Extraction of Uranium from Lignite

A process being developed by the US Atomic Energy Commission may be able to separate uranium from lignite at a cost comparable with the cost of mining uranium in the Colorado Plateau. According to USAEC's director of raw materials, it will be known within a year and possibly very much earlier whether uranium can be economically extracted from lignite. Lignite reserves in Montana and the Dakotas are estimated at between 500,000 and 700,000 tons.

France's First Carbon Black Factory

The first carbon black factory to be set up in France is now in production. Situated at Berne, near Marseille, it is owned by Cabot France, the French subsidiary of Godfrey L. Cabot, Inc. Built at a cost of Fr. 1,500 million (£1,275,000) it will eventually produce 25,000 tons of carbon black a year. Last year France imported 45,000 tons at a cost from each source of $8 million, £150,000 and DM. 3 million.

Cabot hope eventually to extend the new factory and double its output, thereby satisfying almost all France's motor-car and printing industries.

The Berne plant was started in April 1956 and has been completed in record time. It is sited near the Shell-Saint-Gobain refinery which it is hoped will be able to furnish the raw material—aromatic tar—for the carbon black plant in a year's time. Until then, the raw material will have to be imported from the US.

Du Pont Contracts in Japan

Leading Japanese manufacturer of artificial fibres, the Teikoku Rayon Co., report that E.I. Du Pont de Nemours and Co., Inc., US, have agreed to conclude a contract for the production of their Orlon fibre in Japan. The contract will be negotiated by Teikoku and the Toyo Rayon Co. acting as a group.

SA Duty Increases Proposed for Lead Oxides

The Board of Trade and Industries, Union of South Africa, has received representations for an increase of duty on:

(a) Litharge, from free of duty to 20 per cent *ad valorem.*

(b) Dry red lead, from 15 per cent *ad valorem* to 20 per cent *ad valorem.*

(c) Dry white lead, by 15 per cent *ad valorem* with a minimum of 14s per 100 lb.

New German Refineries Announced

Deutsche Erdöl have acquired a site on the Rhine at Karlsruhe for erection of a large oil refinery costing over £25 million. An annual throughput of 3.5 million tons is envisaged. American Getty Oil's German subsidiary is planning a refinery of 1 million tons throughput with heavy

investment in petrochemicals. The refinery will be built near Rees on the Lower Rhine. A figure of up to £40 million has been suggested for this project.

At Emden will be erected the Friesia refinery of Herr Duttweiler with a throughput capacity of 1.5 million tons of crude to yield 76 per cent fuel oil, 12 per cent diesel, 11 per cent petrol and 1 per cent propane gas. Costs are estimated at £6.3 million.

Study of Fischer-Tropsch Catalysts in S. Africa

The South African Coal, Oil and Gas Corporation has signed a fellowship agreement with the Council for Scientific and Industrial Research for developing physical and chemical methods for the characterisation of Fischer-Tropsch catalysts. These catalysts are used for the conversion of carbon monoxide-hydrogen mixtures to petrol at the Corporation's plant in the Orange Free State. The agreement is regarded as an essential first step in the studies aimed at improving the control of catalyst use and increasing the efficiency of the process. It provides for the appointment of three research fellows and non-graduate assistants. Two fellows have initially been appointed; one of these will work in the National Chemical Research Laboratory, and one in the National Physical Laboratory.

French Butyl Plant on Stream Next October

The new 20,000-ton-a-year butyl plant of the Société du Caoutchouc Butyl, now under construction at Port-Jerome near Le Havre, is to come into production in October 1958. The first of its type in Europe, it will cost Fr.6,500m./(£6½m.) At present French annual consumption of butyl is estimated at 9,000 tons.

Production of Synthetic Fibres in Italy

According to the data supplied by *Aschimici* the following quantities of synthetic fibres were produced in Italy in 1956:

	Quantity (metric tons)	Increase over 1955 (%)
Protein fibres ...	**3,392**	**11.9**
Polyamide fibres ...	**7,170**	**49.5**
Polyvynil fibres ...	**852**	**11.5**
Polyester fibres ...	**226**	**403.8**

New Portable Reactor

Nuclear Products-Erco of New York, US, have developed a low-power 'portable' reactor for use in training personnel. It will have a power output of 1 watt and is of the swimming pool type in which the uranium fuel elements are immersed in a tank of purified ordinary water. The company claim that it can be installed in existing buildings without the need for excavations or the construction of special foundations.

Cost of the reactor is expected to be between $135,000 and $150,000.

Borax Prices Higher in US

Major US producer of borax, Pacific Coast Borax Co., a division of US Borax and Chemical Corporation, is to increase prices by 5 per cent on 1 January. Besides the strong demand for borax for boron chemicals, there has been increased usage in ceramic, glass and porcelain industries.

This price increase will also affect prices of boric acid. Price advances amount to $2.50 per ton on borax, 10 mol., and $3 per ton on borax, 5 mol. Anhydrous borax and boric acid will be increased by 4.50 per ton, rasorite sodium borate concentrates by $2.50 and rasorite anhydrous by $3 per ton.

Palermo Factory to Produce Fish Oil

A factory to produce fish oil and flour has started operation near Palermo, Sicily. It will use discards from local canning factories and the oil will go to textile and mechanical industries. The flour will be used for cattle feed.

Building of the factory has been financed by IRFIS and the machinery installed is of German make. It will soon also be provided with machinery for processing its liquid residues which are rich in amino acids and vitamins.

Instruments for US Nuclear Laboratory

Dr. W. Licht, head of the department of chemical engineering of the Cincinatti University, which is to install a nuclear laboratory, would like to see representatives of UK manufacturers of nuclear equipment and instruments if they are visiting the US. Details of requirements are not yet decided; at present a 'sub-critical assembly' and a reactor simulator are contemplated for use next year, with further large-scale equipment for a longer-term programme.

Labelling of Chemicals Imported into Nicaragua

Under regulations which came into force recently, every chemical substance, insecticide or fungicide, imported into Nicaragua or produced or mixed locally, must bear on its container a label in Spanish stating the date of manufacture of the product, its chemical formula, its date of expiration in accordance with the chemical characteristics of the substance, the precautions to be taken in its manipulation and use and the appropriate antidotes to be used in cases of poisoning.

A Nuclear Reactor for Italy

The American Atomic Energy Commission has announced that a permit will soon be granted to American Machine and Foundry Co., of New York, to sell a nuclear reactor of research type to *Societa' Ricerche Impianti Nucleari* (SORIN) in Milan.

SORIN, floated with the financial assistance of Montecatini and Fiat, is to be responsible for the construction in Italy of a large nuclear-electric centre.

Belgian Oil Company to Borrow

Petrofina, the Belgium oil company, is to borrow $22 million against the issue of 20 year bonds bearing interest at 5½ per cent. The money will be raised in Belgium, the Netherlands, Canada, Switzerland and Germany. Last year Petrofina's investment expenditure amounted to B. Fr. 4,500 million (approx. £32,143,000) and a similar sum was budgeted for expenditure on investment projects in 1957.

Facilities for Lapsed Italian Import Licenses

The Ministry of Finance in Rome has decided to allow an automatic renewal for 60 days of lapsed UIC-Import licences, subject to certain conditions. One of the most common instances of such conditions is the arrival of goods in Italy after the lapse of the licence covering them. If, however, the goods in question had been shipped before the date on which the licence lapses, a renewal is allowed.

Second German Titanium Dioxide Plant Starts Production

PRODUCTION started a few weeks ago in the first unit of the Farbenfabriken Bayer titanium dioxide plant at Uerdingen. It has a daily rate of 50 tons, roughly equivalent to one-third of the output of 50,000 tons a year which the whole plant is to attain eventually. Work has started on the second stage but no date has been given yet for the completion of this stage or the complete plant which, together with the 50,000-ton plant of Titan GmbH at Leverkusen is expected to meet all German requirements and leave a small margin for exports.

Capital expenditure on the Uerdingen titanium dioxide plant during the first stage has been DM. 60 million (£5,100,000) and another DM. 40 million (£3,390,000) will be spent on the plant during the second and third stages. The labour force consists of 160 manual and non-manual workers and will rise to 500 when the plant is in full operation, compared with 800 at the Leverkusen plant which has a similar output capacity. The large financial investment is largely due to preparatory work on the site where over 300,000 cubic yards of earth had to be shifted, and to ancillary plants.

The power station and sulphuric acid plant at Uerdingen had to be enlarged in connection with the titanium dioxide project. The installations for sulphuric acid and iron oxide recovery were also very expensive.

The raw material used at Uerdingen is Norwegian ilmenite, and the initial production consists of anatase. Rutile, however, is also to be produced later, and it is expected that this will eventually account for the larger part of the titanium dioxide production at Uerdingen. Last year 40 per cent of the German titanium dioxide supply went into paints and lacquers, 11 per cent into linoleum and oilcloth, 9 per cent into paper, 8 per cent into enamel goods, and 7 per cent into textiles.

Professor Haberland, chairman of Farbenfabriken Bayer AG, estimates the 1957 world production of titanium dioxide at about 800,000 tons of which less than 30 per cent were produced outside the US.

In Parliament

BRUSSELS NOMENCLATURE ADOPTED IN NEW IMPORT DUTIES BILL

THE new Import Duties Board, to be established by the Board of Trade under the Import Duties Bill will be recruited from industry and commerce, on a part-time basis, apart from the chairman. Its function will be to find the facts in an application for a tariff change. Industry would always have access to the board. This was stated by Mr. J. Vaughan-Morgan, Minister of State, Board of Trade, when winding up the second reading of the Bill on Monday.

He was replying to criticisms that the Bill would enable tariff cuts to be imposed by an order-in-council without prior consultation with industry. Mr. C. G. Hirst (Cons., Shipley) had said that the board would not have the degree of independence that was required for its major function. It was a blank cheque and it was not even clear that industry had the right of discussion.

Mr. Vaughan-Morgan declared that the Government could not delegate its control of tariff policy to an independent committee. Industry would always have access to the BoT and the Import Duties Board could hardly find facts correctly without consultations with industry.

Sir David Eccles, BoT President, said that the Bill codified all UK tariff legislation in one instrument. It did not of itself alter any tariff. Under the Bill, the Brussels nomenclature, approved by industry, would be adopted. If the Bill became law, it was hoped that a new tariff would operate from 1 January 1959.

Damage to Crops by Spraying

Replying to an adjournment debate in the House last week on the damage caused to crops by the spraying of chemicals, Mr. J. B. Godber, Joint Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food, said that the long-term answer to safe spraying lay with research. It must be ensured that the results of research were made available to, and impressed upon, all who used such sprays.

The advances in weed control that had distinguished the last decade or so were themselves the products of research and a number of agricultural research institutions were carrying out investigations on all sides of the subject. He instanced the Unit of Experimental Agronomy at Oxford, the Unit of Plant Growth Substances at Wye, the horticultural research stations at Long Ashton and East Malling, the National Vegetable Research Station and the work of the National Institute of Agricultural Engineers at Silsoe.

Translations of Soviet Publications

Replying to a question last week, Mr. H. Nicholls, Parliamentary Secretary to the Ministry of Works, said that the Department of Scientific and Industrial Research had started a comprehensive collection of English language translations of Soviet scientific and technological literature in all fields, except clinical medicine. The material was being made available through the DSIR lending library unit. In addition microfilms of several thousand translations of Russian scientific papers had been ordered from the Chicago library that housed the main US collection.

Arsenic Found in Potatoes

Traces of arsenic found recently in potatoes on sale in Coventry were well within the limits recommended by the metallic contamination sub-committee of the Food Standards Committee, stated Mr. J. B. Godber, Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food, in the House on Monday. Asked if he was aware that the city analyst had expressed strong views about this, Mr. Godber thought the position was perfectly satisfactory as the quantities involved were very small. It was thought that one-eighth of the potato crop was treated with arsenical compounds.

Answering the suggestion that sulphuric acid would provide a less dangerous alternative, he said that sulphuric acid was used and was good in many circumstances. It was, however, a most dangerous acid. He was not sure which was the worst.

Progress with Windscale Reports

Mr. Macmillan stated in the Commons on 28 November that the committees set up following the Windscale accident have reported good progress and hopes of early results. Sir Alexander Fleck's three studies are proceeding with all possible speed. The organisation committee hope to report to the Government before Christmas and the health and safety committee early in January. The report of the technical evaluation committee will take longer. No view on publication of the reports can be taken until the reports are ready.

More Agreements for Restrictive Practices Register

On Monday the House approved an order to call up for registration all classes of agreements not covered by the first order under the Restrictive Trade Practices Act, 1956. Main classes of the remaining agreements are those imposing restrictions on the types or quantities of goods to be produced and agreements under which markets or areas are shared between suppliers. The order comes into operation on 31 December and particulars of agreements in question must be sent to the registrar by 31 March. Particulars of agreements affecting exports, but not home trade, will also have to be furnished.

Shellhaven—Romford Pipeline Described

CONSTRUCTION of a gas pipeline between Shellhaven and Romford was described in a paper given by A. D. L. Copp to the 23rd autumn research meeting of the Institution of Gas Engineers on 19 and 20 November.

It was decided that cathodic protection would be necessary to protect the pipeline because of the presence of very corrosive soil over most of the route. The line will be cathodically protected by one transformer-rectifier and a graphite groundbed installation designed to give a 25-year life. It is estimated that the total cost of the installation will be £500 and the running cost for current 24s a year.

The pipeline will carry gas from Shell's refinery to the North Thames Gas Board's Romford works. It will come into operation in April, 1958. An extension to be carried out in 1958 to the Coryton refinery will add more gas from the Mobil Oil Co., while a further addition to a wharf site on Canvey Island will transmit imported methane.

£1½m. Contract for CJB

A £1½ million contract has been awarded to Constructors John Brown to construct a natural gas pipeline in lower Austria covering 160 miles. The contract has been placed by Niogas-Niederosterreich Gasvertrichs, AG, the lower Austrian organisation responsible for gas fuel distribution. Laying of pipelines has begun.

Free Trade and Europe's Chemical Industry

CHAIRMAN of the Italian Association of Chemical Industries, Signor Sessa, has announced that good progress is being made in the establishment of a joint board among chemical industry associations of the six countries of the Common Market. Constitution of the new board is being drafted and is to be submitted shortly for the approval of these chemical associations of 'Little Europe'. The new association will suggest and draft agreements, carry out studies and market research, and co-ordinate output and the distribution of raw materials and chemical products.

Signor Sessa has warned the Italian chemical industry not to underestimate the importance of the current negotiations for the Free Trade Area.

NIRNS Appointment for New Rutherford Laboratory

The National Institute for Research in Nuclear Science's high energy laboratory at Harwell, to be known as the Rutherford High Energy Laboratory, to commemorate the work of the late Lord Rutherford, will have as director, Dr. T. G. Pickavance.

The new laboratory is being built on a site adjacent to AERE and will house the institute's first large accelerator, the main part of which will have a magnet ring 120 ft. in diameter, weighing over 6,000 tons.

Chemical Society Library

The library of the Chemical Society will close at 1 p.m. on Monday, 23 December, and will re-open at 9.30 a.m. 28 December.

UK Chemical Exports/Imports for January-October 1957

EXPORTS		QUANTITY Jan./Oct. 1956	QUANTITY Jan./Oct. 1957	VALUE Jan./Oct. 1956	VALUE Jan./Oct. 1957
INORGANIC				£	£
Acids	Cwt.	158,921	177,204	538,436	571,538
Copper sulphate	Tons	42,504	26,809	4,411,522	2,344,579
Sodium hydroxide	Cwt.	4,601,423	3,704,122	5,767,229	4,646,075
Sodium carbonate	,,	4,008,117	3,755,019	2,488,776	2,576,865
Aluminium oxide	Tons	21,683	28,086	707,853	972,104
Aluminium sulphate	,,	36,004	27,632	513,913	392,255
Other aluminium cpds.	,,	2,866	3,105	120,600	136,013
Ammonia	Cwt.	78,921	66,864	294,605	260,667
Ammonium cpds. (not fertilisers or bromide)	Tons	19,494	15,118	739,258	590,228
Arsenical compounds	,,	3,777	3,350	291,036	238,331
Bismuth compounds	Lb.	266,575	311,742	226,664	257,260
Bleaching powder (chloride of lime)	Cwt.	307,428	184,088	506,275	322,561
Hydrosulphite	,,	65,514	72,833	520,734	571,436
Other bleaching materials	,,	88,865	116,798	401,758	544,281
Calcium compounds	,,	279,488	289,248	573,360	571,137
Carbon blacks	,,	331,891	641,274	1,325,376	2,330,925
Cobalt compounds	,,	11,038	13,147	499,184	469,766
Iron oxides (chemically manufactured)	,,	79,826	80,661	255,474	244,888
Lead compounds	,,	38,513	45,467	260,196	275,297
Magnesium compounds (nes)	Tons	10,709	15,635	572,730	751,561
Nickel salts	Cwt.	63,555	69,623	613,344	765,697
Potassium compounds (not fertilisers and bromides)	,,	45,496	50,007	441,623	489,442
Sodium bicarbonate	,,	619,044	603,904	552,166	555,454
Sodium phosphates	,,	65,981	104,935	306,199	491,528
Sodium silicate (water glass)	,,	342,336	273,724	300,815	247,164
Other sodium cpds.	,,	1,475,667	1,459,042	3,196,791	3,259,901
Tin oxide	,,	6,453	7,488	235,460	271,744
Zinc oxide	Tons	4,809	5,786	381,724	413,312
Inorganic chemicals (nes)		—	—	3,911,772	3,990,915
ORGANIC					
Acids, anhydrides and their salts and esters		—	—	1,114,675	1,078,810
Glycerine	Cwt.	50,631	89,574	549,706	823,870
Ethyl alcohol, etc., and mixtures of alcohols (nes)		—	—	1,132,987	1,261,374
Acetone	Cwt.	163,095	98,085	415,593	316,352
Citric acid	,,	30,359	41,659	299,453	407,938
Gases, compressed, liquid or solid (nes)		—	—	806,168	1,369,261
Phenol	Cwt.	72,479	111,884	462,780	720,715
Salicylates	Lb.	793,998	889,892	200,221	251,168
Sodium compounds	Cwt.	22,824	25,238	260,712	331,266
Sulphonamides not prepared	Lb.	1,327,739	1,223,237	710,261	898,173
Dyestuffs intermediates (nes)	Cwt.	62,176	83,645	1,086,529	1,197,303
Organic compounds (nes)		—	—	11,371,177	13,874,366
Total for elements & cpds.		—	—	**49,365,140**	**52,583,520**
Coal tar	Tons	104,131	79,026	966,836	854,264
Cresylic acid	Gall.	3,208,152	2,483,385	1,038,179	917,502
Benzol	,,	1,157,525	18,784	193,060	7,823
Creosote oil	,,	18,475,678	15,311,711	1,215,090	1,041,528
Other mineral tars and crude chemicals	Cwt.	217,437	158,084	506,087	357,679
Pigment dyestuffs	Cwt.	20,025	24,570	835,539	984,450
Other synthetic dyestuffs	,,	155,606	159,989	7,033,423	7,787,444
Synthetic organic pigments	,,	19,555	21,010	675,623	843,922
Vegetable and animal dyeing extracts	,,	3,452	3,062	108,760	110,200
Tanning extracts (solid or liquid)	,,	87,525	105,885	392,143	470,834
Synthetic tanning materials	,,	59,737	65,377	211,579	250,645
Pigments, paints, varnishes, etc.		—	—	19,598,865	20,070,948
Drugs, medicine, etc.		—	—	29,343,983	33,006,724
Explosives		—	—	8,984,337	8,672,683
Insecticides, fungicides and rodenticides	Cwt.	310,482	295,636	3,658,890	3,661,367
Weedkillers	,,	74,285	81,984	879,008	889,370
Carbons, decolourising or activated	,,	79,431	66,465	333,254	280,322
Tetra-ethyl lead anti-knock compound	Gall.	4,005,965	4,501,384	8,587,790	9,823,399
FERTILISERS					
Ammonium nitrate	Tons	3,390	2,118	109,514	69,544
Ammonium sulphate	,,	23,065	129,057	448,508	2,245,185
Phosphatic and potassic		—	—	54,341	52,950
Other fertilisers		—	—	324,363	291,829
PLASTICS MATERIALS					
Phenol and cresol formaldehyde resins	Cwt.	50,424	57,291	364,540	400,617
Urea formaldehyde resins	,,	223,195	188,123	1,068,995	942,497
Vinyl resins, unplasticised	,,	123,774	169,456	1,218,422	1,482,407
Vinyl resins, plasticised	,,	90,524	119,831	1,168,269	1,430,745
Other vinyl resins	,,	155,403	179,817	1,939,390	2,299,804
Moulding materials	,,	632,341	777,233	8,088,935	10,074,454
Sheet, rod, tube, film and foil	,,	224,561	254,508	6,871,428	7,404,043
MISCELLANEOUS					
Photographic chems.(nes)	Cwt.	27,963	33,535	495,484	569,227
Scientific glassware	,,	18,377	16,824	874,695	915,801
Chemical & gas machinery	,,	104,968	138,595	1,866,003	3,058,784

IMPORTS		QUANTITY Jan./Oct. 1956	QUANTITY Jan./Oct. 1957	VALUE Jan./Oct. 1956	VALUE Jan./Oct. 1957
INORGANIC				£	£
Acids	Cwt.	50,835	52,522	150,057	162,481
Aluminium oxide—					
Crude, unground	Tons	19,216	15,055	958,960	819,363
Ground or graded	,,	2,676	2,684	284,680	286,451
Silicon carbide	,,	10,544	8,021	1,074,134	812,220
Arsenic trioxide	,,	4,771	3,002	165,515	88,951
Borax, refined	Cwt.	392,102	423,140	741,037	836,417
Calcium carbide	,,	820,771	998,326	1,509,044	1,911,239
Carbon black channel	,,	140,620	149,602	796,419	854,870
Other carbon blacks	,,	72,670	66,431	281,936	252,611
Cobalt oxides	,,	11,215	6,351	701,519	397,195
Iodine	Lb.	455,279	755,249	227,965	291,157
Mercury	,,	1,280,975	1,251,732	1,403,067	1,372,074
Sodium, calcium, potassium, lithium	Cwt.	59,897	24,026	876,701	195,470
Potassium carbonate	,,	67,230	89,908	217,919	294,584
Other potassium cpds. (not fertilisers)	,,	65,491	83,436	304,594	379,909
Selenium	Lb.	171,449	122,866	1,011,283	610,594
Silicon	Tons	5,158	4,444	768,687	734,671
Sodium chlorate	Cwt.	86,585	105,530	264,498	355,347
Sodium phosphate	,,	19,835	3,635	88,798	24,703
Other sodium cpds.	,,	251,328	284,934	980,920	1,060,121
Inorganic chemicals (nes)		—	—	2,283,640	2,514,771
ORGANIC & OTHERS					
Acids, anhydrides and their salts and esters		—	—	1,605,715	2,381,002
Glycerine	Cwt.	94,334	102,108	709,235	628,200
Menthol	Lb.	80,422	129,312	165,768	265,597
Naphtha, methyl alcohol and alcohols and alcohol mixtures (nes)		—	—	2,298,610	2,977,195
Turpentine	Gall.	655,228	570,399	165,487	149,290
Glycol ethers and esters	Lb.	5,800,724	6,399,159	494,691	557,852
Sodium compounds	Cwt.	92,501	112,839	928,122	1,194,198
Styrene (monomeric)	Gall.	2,988,308	1,140,914	1,630,858	581,023
Vinyl acetate (monomeric)	Tons	8,824	4,149	1,281,547	483,453
Dyestuffs intermediates	Cwt.	6,577	25,782	411,870	845,325
Organic compounds (nes)		—	—	10,202,363	10,054,622
Synthetic organic dyestuffs and compounds	Cwt.	29,523	30,657	2,251,432	2,836,357
Titanium dioxide	Cwt.	57,896	92,340	626,991	892,851
Other pigments	,,	148,016	197,959	530,069	617,212
Vitamins		—	—	1,239,817	914,759
Antibiotics		—	—	616,645	788,564
Alkaloids		—	—	789,646	531,159
FERTILISERS					
Basic slag	Tons	60,663	73,664	485,543	604,612
Potassium chloride	Cwt.	9,128,006	8,729,187	7,459,840	7,258,269
Potassium sulphate	,,	202,763	266,377	204,465	262,046
Other fertilisers		—	—	1,228,625	1,511,843
PLASTICS MATERIALS					
Vinyl resins	Cwt.	102,021	145,376	1,443,480	1,823,398
Other synthetic resins	,,	159,001	229,473	2,411,071	3,140,995
Polystyrene	,,	4,054	12,335	49,748	151,324
Other moulding powders	,,	21,831	48,560	386,846	971,055
Sheet, rod, tube, film and foil	,,	31,938	31,241	1,917,000	1,833,740
MISCELLANEOUS					
Chemicals, chemical materials & products (photographic) (nes)	Cwt.	—	—	4,057,773	4,716,592
Chemical & gas machinery	,,	18,739	30,312	832,687	1,246,040

EXPORTS OF ALL CHEMICALS TO PRINCIPAL MARKETS

	Jan./Oct. 1955	Jan./Oct. 1956	Jan./Oct. 1957
Gold Coast	3,341,753	3,844,375	4,337,778
Nigeria	4,373,741	4,623,857	4,299,760
Union of South Africa	9,725,747	9,924,412	10,596,068
Rhodesia and Nyasaland	1,968,205	1,977,026	2,426,162
India	13,773,225	15,403,962	14,729,000
Pakistan	3,696,299	3,276,480	2,923,694
Singapore	3,261,335	3,841,803	3,450,302
Federation of Malaya	2,896,713	3,105,118	3,261,745
Ceylon	2,183,719	1,973,681	2,794,502
Hong Kong	2,642,186	2,943,923	3,726,045
Australia	16,246,292	14,672,214	18,325,924
New Zealand	6,560,707	6,140,807	7,167,185
Irish Republic	5,595,165	5,628,320	5,526,185
Finland	2,730,892	2,656,087	2,254,364
Sweden	4,981,074	5,309,575	6,057,983
Norway	2,792,589	2,971,941	3,452,478
Denmark	3,247,035	3,720,683	3,918,625
Western Germany	4,597,039	5,198,631	7,098,172
Netherlands	6,353,010	7,344,610	8,380,694
Belgium	4,370,848	4,887,750	5,467,116
France	5,695,575	6,174,203	7,278,832
Switzerland	2,103,119	2,548,987	2,726,539
Portugal	1,487,370	1,838,735	2,211,951
Italy	5,068,483	7,253,528	7,401,341
Netherlands Antilles	2,346,891	2,262,468	2,800,393
Iraq	1,807,092	2,092,534	2,305,193
Iran	1,670,118	1,519,273	2,694,531
Burma	2,236,941	2,422,268	3,633,889
Japan	1,035,882	1,634,502	2,081,429
United States of America	6,399,145	7,269,697	6,142,118
Brazil	196,382	2,044,282	2,414,346
Argentine Republic	4,196,611	2,593,387	4,534,492
Total for all Countries	**192,960,497**	**202,517,414**	**222,635,363**

PEOPLE in the news

● SIR CYRIL HINSHELWOOD was re-elected president of the Royal Society last week at the anniversary meeting. PROFESSOR W. V. D. HODGE, Lowndean professor of astronomy and geometry in the University of Cambridge, was elected physical secretary in succession to SIR DAVID BRUNT. Other officers re-elected were: treasurer, SIR WILLIAM PENNEY, director of the Atomic Weapons Research Establishment, Aldermaston; biological secretary, SIR LINDOR BROWN, Jodrell professor of physiology at University College, London; and foreign secretary, DR. H. G. THORNTON, lately head of the department of soil microbiology at Rothamsted Experimental Station.

Other members of council elected included: BRIGADIER J. S. K. BOYD, lately director of the Wellcome Laboratories of Tropical Medicine; SIR CHARLES DODDS, Courtauld professor of biochemistry, London University; PROFESSOR G. GEE, Sir Samuel Hall professor of chemistry, Manchester University; DR. H. GODWIN, reader in quaternary research, Cambridge University; PROFESSOR R. D. HAWORTH, Firth professor of chemistry, Sheffield University; PROFESSOR W. T. J. MORGAN, deputy director of the Lister Institute and professor of biochemistry, London University; PROFESSOR D. M. NEWITT, Courtauld professor of chemical engineering, Imperial College of Science and Technology; LORD ROTHSCHILD, assistant director of research in the department of zoology, Cambridge University; DR. K. M. SMITH, director of the Virus Research Unit (Agricultural Research Council), Molteno Institute, Cambridge University; PROFESSOR L. R. WAGER, professor of geology, Oxford University.

● MR. GEOFFREY COLEMAN, B.Sc., sailed for Australia in SS *Orcades* this week. Aged 27, he has been awarded a research scholarship at the John Curtin School of Medical Research at the Australian University, Canberra. He will study for a Ph.D. and expects to be away two or three years. Lately he has served in the food research department of Unilever Ltd., at Bedford.

Major Norman Hardy, executive officer of the Pyrethrum Board of Kenya, who is in London on completion of a sales tour of the UK, US, Germany, France and Italy

● MR. C. W. A. MUNDY has been elected president of the Paint Research Association. He had previously been hon. treasurer and the vacancy caused by his election as president has been filled by MR. J. W. COLE (Arthur Holden Ltd.). The two new vice-presidents elected are MR. L. R. HICKSON (Hadfields (Merton) Ltd.), and MR. C. D. O'SULLIVAN (Walter Carson). There were eight nominations for the six vacancies on the council, so a ballot was necessary. Those elected were: MR. N. A. BENNETT (Griffiths Bros. and Co.) MR. J. W. COLE, MR. P. J. GAY (Hangers Paints), DR. H. W. KEENAN (Beck Koller and Co.), MR. R. J. LEDWITH (Cellon, Ltd.) and MR. S. G. TINSLEY (British Titan Products Ltd.).

● MR. A. J. SOMERS, F.R.I.C.S., has retired after 36 years with Borax Consolidated Ltd. Since February 1946 he has been a member of the board of the parent company, now Borax (Holdings) Ltd. Originally engaged as a scientist, Mr. Somers spent many years between the wars investigating and promoting the industrial uses of borates; he became sales manager of the company in 1940. At the end of the war he travelled widely overseas, and was responsible for many developments in technical service and research.

● MR. A. WORMALD has relinquished his appointment as managing director of Fisons Pest Control Ltd. but continues as chairman. He also continues as commercial director of Fisons Ltd. DR. E. PARRY JONES and MR. R. M. MELHUISH have been appointed joint managing directors and MR. A. S. WOODHAMS has been appointed a director.

● The resignation of MR. C. C. LAST from the board of Bakelite Ltd. is announced. Mr. Last is retiring at the end of the year owing to ill-health. He will continue to serve the company as a consultant and will remain chairman of the British Plastics Federation.

● SIR ALEXANDER TODD will arrive in Stockholm on 7 December to receive the Nobel prize for chemistry. He is travelling with his wife, son and two daughters. The Nobel ceremonies are on 10 December.

● MR. S. C. JONES, B.Sc., has been appointed to the board of Hickson and Welch Ltd. He has been with the company since 1940—the year when he completed his studies at Cardiff University. He joined the company as plant chemist and became production manager of the Ministry of Supply factory on the Castleford site in 1944. In 1946 when Hickson and Welch Ltd. bought the Ministry of Supply plant, Mr. Jones took charge of the intermediates division of the works and became works manager in 1955.

● MR. R. E. NEWELL, managing director of the Wilton works of Imperial Chemical Industries is a member of an international panel set up to study the possible construction of nuclear power station in southern Italy. Chairman of the panel is Dr. W. B. Lewis, vice-president, Atomic Energy of Canada Ltd.

Two firms of consultants have been appointed for the project. They are the Internuclear Co. of the US, and Kennedy and Donkin of London.

● SIR ALEXANDER FLECK, ICI chairman, SIR CLAUDE GIBB, chairman, Nuclear Power Plant Co., and SIR VINCENT DE FERRANTI, chairman, Ferranti Ltd., received hon. fellowships at Manchester College of Science and Technology, last week.

● DR. ARTHUR BALFOUR, of Humphreys and Glasgow, is in a Helsinki hospital with several cracked ribs. He was a member of the five-man team that has been touring underground gasification plants in the Soviet Union. The Russian aircraft in which the team were returning to London last Monday overshot the runway at Helsinki airport and crashed. The rest of the team were unhurt. Three of them are now back in Britain but the leader, MR. JAMES NORVAL, of the National Coal Board, is staying at Mr. Balfour's bedside.

● MR. F. MARZILLIER, vice-chairman of Marchon Products Ltd. and Solway Chemicals Ltd., of Whitehaven, has decided for personal reasons to move

F. Marzillier, who is resigning his full-time directorships with Marchon and Solway

from Cumberland to the south of England, as from the end of 1957.

He is resigning his full-time executive directorship in the two companies, but he will retain his seat on the boards in an advisory capacity.

● DR. T. G. PICKAVANCE, who has been appointed director of the Rutherford High Energy Laboratory (see p. 933), is at present deputy head of the General Physics Division of the Atomic Energy Authority Research Establishment at Harwell. He is in charge of the group within AEA responsible for the design and supervision of the construction of the new accelerator for the institute, and will continue to undertake this work. He has been at Harwell since 1946 and has been deputy head of the General Physics Division since 1955. From 1939 to 1946 he worked on nuclear problems as a part-time lecturer at Liverpool University.

● DR. R. HOLROYD, deputy chairman of ICI Ltd., has been appointed Castner Medallist for 1958. The medal commemorates the work of Hamilton Young Castner and is one of the Society of Chemical Industry's senior awards.

Commercial News

Nechells Expansion Plans of Midland Tar Distillers

Much of the group capital expenditure commitments of Midland Tar Distillers Ltd., which amounted to approximately £493,000 as at 30 June last, is required in connection with the Nechells works reconstruction scheme. The directors state in the company's annual report that this scheme includes the erection of a continuous crude tar distillation plant to replace the existing intermittent stills.

Trading profits of the group after depreciation, etc., increased from £416,589 to £467,323 in 1956–57. The parent's net income of £215,476 compares with £188,464, of which £130,000 (£100,000) is transferred to reserves. Current assets of £3,171,805 (£2,831,470) include stocks and equipment £1,362,670 (£1,292,585). Of current liabilities of £1,479,943 (£1,444,327) the sum of £264,933 (£140,496) is due to the bankers.

The dividend is repeated at 10 per cent.

Bakelite Ltd.

Bakelite Ltd. have announced an interim dividend of 5 per cent (same) which will be paid on 10 December. Total dividend for last year was 15 per cent.

British Benzol

Net profit of British Benzol and Coal Distillation after all charges has declined from £34,991 to £22,330. Taxation was £47,600 (£56,350). £10,000 has been placed to general reserve (nil).

Current payment of 10 per cent is being made by British Benzol and Coal Distillation Ltd. This is the same as paid in the previous year. Total dividend for the year is 15 per cent (same).

Coalite and Chemical

The interim dividend being paid by Coalite and Chemical Products Ltd. is 3 per cent on increased capital. The corresponding dividend last year was also 3 per cent. The total dividend paid last year was 12½ per cent.

Fisons Ltd.

Consent has been received from the Capital Issues Committee for Fisons Ltd. to raise £3 million by an issue of ordinary shares. This was announced by Fisons' chairman, Sir Clavering Fison, at the annual meeting on 29 November.

The board intend to make the issue next Spring, but the exact date will depend upon the financial climate at the time. In the annual report, Sir Clavering said that permission was being sought to raise about £4 million by an issue of ordinary shares (see CHEMICAL AGE, 16 November, p. 820).

McKechnie Bros.

In the full report of McKechnie Brothers, manufacturers of non-ferrous metals and chemicals, for the year ended 31 July last, the chairman, Mr. J. D. McKechnie, indicates that last year's heavy fall in copper prices caused depreciation of £376,000 in parent stock values, the whole of which has been charged against revenue. Trading profits dropped in consequence from £1,328,269 to £713,996. Net profit is £133,843 against £525,132.

The group financed capital additions of £845,411 and at end-July commitments were £268,000—covered by liquid resources of £1.44 million.

Total dividend is 15 per cent, the same as for the previous year, plus the 2½ per cent net 'special' paid in September 1956.

Items not expected to recur this year are the large depreciation on metal stocks and the losses on the electrolytic copper and titanium plants which are now closed down.

Mr. McKechnie reports that with the copper price lower 'the order book has been more buoyant and a reasonable profit is anticipated'. Trading generally is described as 'fair'. There has been an improvement in the company's extruded products, which form a large part of its trade. Chemicals, however, are stated to be encountering severe competition and orders are down on 1955–56. It is suggested that growing benefit should be derived from a heavy capital outlay.

Griffiths Hughes Proprietaries

Griffiths Hughes Proprietaries Ltd. have declared an interim of 2½ per cent on ordinary for the year ending 31 March 1958.

NCB Buy Tar Company

The Darlington tar distilling and chemical manufacturing company, Thomas Ness Ltd., is being bought by the National Coal Board. Members of the board of the Durham division, Dr. William Reid, Mr. D. E. Baird, Mr. C. D. Manley, Mr. S. J. Reid and Mr. M. D. Edington, have been nominated to join the reconstituted board with Mr. T. F. Bower, Mr. W. A. Walmsley and Mr. E. A. Bower who are to continue as full-time executive directors. Dr. Reid is to be chairman and Mr. T. F. Bower and Mr. Walmsley, joint managing directors. Mr. J. W. Watson has resigned.

The name and identity of the company is to be retained and the company's operations will continue to be directed from Darlington and Newcastle-upon-Tyne.

Yorkshire Dyeware

The directors of Yorkshire Dyeware and Chemical Co. have announced an interim dividend of 5 per cent (same). Total dividend for last year was 20 per cent. This included a 5 per cent bonus.

Unilever Ltd.

Reference has been made by Unilever Ltd. this week regarding acceptances of the cash offer by the company for the outside minority interest in the preference capital of J. and E. Atkinson. These acceptances represent a very substantial majority of the preference shares, but do not amount to 90 per cent of the shares. Unilever has therefore extended the date for acceptance until 21 December.

The cash offer by Unilever for the outside minority interest in the preference and preferred ordinary capital of A. and E. Pears has been accepted by 90 per cent of the shares of each class. The offer has therefore become unconditional.

NEW COMPANIES

AEROSOL RESEARCH CO. (GREAT BRITAIN) LTD. Cap. £1,000. Designers and manufacturers of and dealers in valves, valve components, particularly for pressure-tight containers and aerosol packages, etc. Reg. office: Room 150, 20 Copthall Avenue, London EC2.

B. L. DELAUNAY AND CO. LTD. Reg. 26 November. Capital £500. Manufacturers of and dealers in charcoal and resinous gums of all kinds, chemicals, gases, etc. Directors: B. L. Delaunay and M. J. Delaunay (Directors of Asbestos Pluvitite Manufacturing Co. Ltd.) Reg. office: 130 Acton Lane, London NW10.

GREENWOOD LABORATORIES LTD. Cap. £10,000. Manufacturers of pharmaceutical and food products, etc. Directors: J. Shaw and R. F. Inch. Reg. office: 199 Piccadilly, London W1.

NITROVIT LTD. 22 November. Cap. £10,000. Manufacturers of and dealers in animal feedingstuffs, poultry foods, seeds, grain, cereals, artificial fertilisers, manures, etc. Subscribers: H. W. Thorn and D. Hare. Reg. office: 6–8 Sackville Street, London.

JOHN POYNTER SON AND MACDONALD'S LTD. Cap. £100. Manufacturers of and dealers in animal charcoal, sulphate of ammonia, etc. Directors: R. J. G. Macdonald, A. W. Ronald, and A. V. Macdonald. Reg. Office: 51 Biggar Street, Glasgow E1.

INCREASES OF CAPITAL

DENVER LABORATORIES LTD., manufacturing chemists, etc., 12 Carlisle Road, London NW9. Increased by £900, beyond the registered capital of £100.

MUNMOR OILS AND CHEMICALS LTD., 1A Market Street, Altrincham, Cheshire. Increased by £3,000, beyond the registered capital of £2,000.

CHEMICAL BUILDING PRODUCTS LTD., 61 Portland Place, London W1. Increased by £10,000, beyond the registered capital of £500.

HENRY SIMON (HOLDINGS) LTD., engineers, etc., Bird Hall Lane, Cheadle Heath, Stockport, Ches. Increased by £2,250,000, beyond the registered capital of £1,750,000.

CHANGES OF NAME

CHEMICAL BUILDING PRODUCTS LTD., 61 Portland Place, London W1. Name changed to Chemical (Holding) Ltd.

MACCLESFIELD CHEMICALS LTD., High Street Works, Macclesfield. Name changed to Mauritex Components Ltd.

LONDON GAZETTE

Voluntary Winding-up

SHELL TANKERS (EASTERN) LTD. Members voluntary winding-up. General meeting of members will be held at St. Helen's Court, Great St. Helen's, London EC3, on 30 December, at 10.30 a.m.

Chemical Stocks and Shares

KLEEMAN BID FOR ERINOID

OVER the last week markets have been over-shadowed, awaiting the terms of British Petroleum's new issue, and consequently keeping markets virtually at a standstill. One firm feature was the tendency of sterling against the US dollar. Coalite and chemicals on their unchanged interim dividend remained around 3s 9d. Fisons having been to 50s reacted to 49s 6d.

1957 High	1957 Low		4 Dec.	Change on last two weeks
23/7½	16/4½	Albright & W. 5/-	17/1½	−3d
11/6	10/6	Anchor 5/-	11/-	+3d
1/3	1/-	Ashe 1/-	1/2	+1d
24/6	20/-	Bakelite 10/-	21/-	−1/1½
7/10½	4/9	Beck 5/-	4/9	—
36/-	19/6	Borax 5/- Dfd.	22/3	−1/1½
10/9	8/10½	Bt. Chrome 5/-	9/6	+3d
13/10½	10/3	Bt. Glues 5/-	11/4½	+10½d
6/4½	4/9	B. I. Plast. 2/-	5/3	+4½d
8/6	5/6	Bt. Tar 2/6	7/6	+6d
22/3	17/6	Brothertons	18/-	—
35/-	27/3	Bt. Xylonite	29/6	−9d
4/4½	3/6	Coalite 2/-	3/9	—
60/3	45/9	Fisons	49/6	−6d
43/-	24/-	Glaxo 10/-	35/3	−1/-
9/6	7/6	Hardman & H. 5/-	7/9	−3d
34/6	24/1½	Hickson & W. 10/-	29/3	+1/3
46/6	36/1½	ICI	37/7½	−1/1½
4/9	2/7½	Kleeman 1/-	3/4½	+3d
22/1½	14/6	Laporte	16/1½	+7½d
22/-	15/-	Lawes 10/-	15/-	—
19/3	12/4½	Monsanto 5/-	13/9	—
15/6	11/-	Reichhold	11/9	−3d
11/9	9/-	Yorkshire Dye 5/-	9/3	−6d

Last week O. and M. Kleeman made a formal offer for the preference and ordinary capital of Erinoid. The terms offered are: For every four £1 4½ per cent preference stock units of Erinoid, £1 in cash and three 6½ per cent £1 preference shares of Kleeman. For every four 5s Erinoid ordinary, 16s nominal of 7 per cent first debenture 1978/82 and five 1s ordinary of Kleeman's. Accepting Erinoid ordinary holders may sell the debenture to Singer and Friedlander at £98½ per cent free of expenses.

This offer is worth 7s 8d per share of Erinoid 5s ordinary and in comparison with their market price of 6s 6d, sounds attractive. Kleeman shares have remained around 3s 3d.

Erinoid countered with proposals which would give 5s cash by way of partial redemption plus an increase in the dividend rate from 4½ per cent to 6½ per cent for preference and 12½ per cent against their 7½ per cent on ordinary. In no way does this sound convincing. Recalling the chairman's remarks on dividend policy in his speech last week, it seemed obvious that the board intended to continue a conservative dividend policy in view of the general uncertainties of trading, and it seems that Erinoids' hand has been forced.

The next few days will be of interest in this bid situation, and advice to shareholders offered by this writer is to sit back and await additional information either from Erinoid or Singer and Friedlander who are representing Kleeman's.

TRADE NOTES

Laporte Titanium Ltd. have reduced the basic selling price of titanium oxide. Runa RH and RG is now £5 a ton, as is Tiona G, WD, and S. Tiona 80 is now £4 a ton, and Tiona 50 £2 5s. Tiona 25 is £1 5s and Tocarba 25 is £1 10s.

Pyrene Market Extended

An agreement has been signed whereby the Pyrene Co. Ltd., Brentford, have acquired additional trade marks, patents, sales and manufacturing rights hitherto owned by the American Pyrene Co. It will enable the British company to develop a substantial export market in South and Central America, and a number of European countries, areas where trading has hitherto been restricted. Pyrene Co. Ltd., will now have a world market for their products outside the US.

Mobil in Midlands

Charrington, Gardner, Locket and Co. Ltd. are to market fuel oils made by Mobil Oil Co. in the Midlands. Charrington's already market these products in London, the Home Counties and East Anglia.

Changes of Address

Chemidus Plastics Ltd. have changed the address of their sales and administrative offices to 26 Progress Way, Purley Way, Croydon, Surrey, telephone CROydon 9351. While their accounts department will remain in the City of London, all enquiries, orders and other commercial and technical matters will be dealt with at the new address.

Glasgow office of Igranic Electric Co. Ltd., Bedford, has moved into new premises at 242 West George Street, Glasgow C2. (Telephone: City 4537, 4538.)

THE Chemical Spraying Co. Ltd., Perth, specialists in agricultural and horticultural spraying and fertiliser distributors, have transferred their headquarters to Chemical House, Glenearn Road, Perth. Telephone: 3201.

The head office of Free Piston Engine Co. Ltd., has moved to Makay Works, Faggs Road, Feltham, Middlesex. A spares and service division is also being established at this address.

Hylite titanium alloys

William Jessop and Sons, have now extended their Hylite range of titanium alloys to include Hylite 15—commercially pure titanium, supplied to DTD specifications 5003 and 5023 and Hylite 45—6 per cent aluminium and 4 per cent vanadium. This last is a high strength alloy which responds to heat treatment and is available in sheet form as well as rolled bar forgings.

Engineering Division Formed

Airtech Ltd., Haddenham, Bucks, who carry out work on aircraft, missiles and specialised vehicles have formed an engineering division. In addition to offering a consultant design service for complete hydraulic and pneumatic systems they are to manufacture a range of these components for industry at home and overseas.

FOR YOUR DIARY

MONDAY 9 DECEMBER

Institute of Metals, Metal Physics Committee—Harwell; A.E.A. Symposium until 10 December. 'Vacancies and other point defects in metals and alloys'.

Society of Chemical Industry, Plastics and Polymer Group—London; 14 Belgrave Square SW1. 6.30 p.m. 'Experiments on, and theory of, formation of fibres' by Prof. H. Batzer.

TUESDAY 10 DECEMBER

Society of Chemical Industry, Chemical Engineering Group with Oil and Fats Group—London; 14 Belgrave Square SW1. 5.30 p.m. 'Continuous processing in the oils and fats industry' by Dr. B. Braae.

Society of Instrument Technology—Manchester; College of Science and Technology. 7.30 p.m. 'Instrumentation in chemical analytical control' by Dr. B.W. Bradford.

WEDNESDAY 11 DECEMBER

Incorporated Plant Engineers—Nottingham; Sherwood Room, County Hotel, Theatre Square. 7 p.m. 'Mechanical handling' by A. E. Holmes.

Plastics Institute, with Institute of Rubber Industry—Cardiff; Angel Hotel. 7 p.m. 'Use of rubber and plastics in the cable industry, and new materials for telecommunication wires and cables' by K. H. Whitlock.

Institution of Chemical Engineers—Birmingham; Midlands Institute, Paradise Street. 6.30 p.m. 'Models for piping design and construction' by M. K. Brown and E. Holmes.

Society for Analytical Chemistry—Birmingham; The University, Mason Theatre, Edmund Street 3. 6.30 p.m. 'Analytical chemistry of copper and its alloys' opened by H. J. G. Challis.

Institute of Metals, with Institute of British Foundrymen—London; Constitutional Club, Northumberland Avenue. 7.30 p.m. 'Properties of castings' by F. Hudson.

Society of Chemical Industry, Food Group—London; 6.15 p.m. 14 Belgrave Square SW1. 'Some nutritional and allied problems confronting the food manufacturer' two papers on 'the use of antioxidants' by C. H. Lea and R. J. Ward.

THURSDAY 12 DECEMBER

Chemical Society—London; Burlington House, Piccadilly W1. 7.30 p.m. Original papers, 'N-Oxides and related compounds, Part 9. The electric dipole moments of pyridine and trimethylamine boron trihydride and trihalides' by C. M. Bax, A. R. Katritzky and L. E. Sutton. 'Tetrahedral complexes of nickel(II) and the factors determining their formation, Part I. Bis(triphenylphosphine) nickel(II) compounds' by L. M. Venanzi. 'The relation between proton dissociation constants and the stability constants of complex ions' by J. G. Jones, J. B. Poole, J. C. Tomkinson and R. J. P. Williams. 'The oxidisation-reduction potentials of complex ions' by J. C. Tomkinson and R. J. P. Williams.

Royal Institute of Chemistry—London; Northampton Polytechnic, St. John Street EC1. 7 p.m. 'Recent advances in the chemistry and technology of the rare earth metals' by A. R. Powell.

FRIDAY 13 DECEMBER

Society of Instrument Technology—Birmingham; Regent House, St. Phillips Place, Colmore Row 3. 'Electric instrumentation, trends and implications' by R. J. Redding.

Metal Indicators Discussed

A paper by Dr. Rudolf Pribil, of the Czechoslovak Academy of Sciences, called 'A new line in the development of metal indicators' was read at two recent meetings of the Society of Analytical Chemistry. The first was held by the Midlands section of the society on 13 November at Birmingham, and the paper was read again at a joint meeting of the Scottish section and the department of chemistry of Edinburgh University, at the University, on 20 November.

The importance of metalochromic indicators as end-point indicators in complexometry was explained and the general structural prerequisities of such indicators discussed from the viewpoint of Korbl and Pribil's theories.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s. 3d. including postage; annual subscription £8.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period

ACCEPTANCES

Open to public inspection on 8 January

Electrically insulating compositions. General Electric Co. **788 759**

Manufacture of unsaturated aliphatic ketones and the conversion thereof into unsaturated cyclic ketones. Hoffmann-La Roche & Co. AG, F. **788 680**

Organopolysiloxanes containing silicas as fillers. General Electric Co. **788 879**

Manufacture of highly polymeric polymethylene terephthalates. Imperial Chemical Industries Ltd. **788 880**

Phosphate coating of metals. Pyrene Co. Ltd. **788 957**

Synthetic organic detergent compositions. Colgate-Palmolive Co. **788 681**

Manufacture of compositions containing sodium triphosphate. Knapsack-Griesheim AG. **788 682**

Quarternary ammonium compounds and use thereof. Rohm & Haas Co. **788 881**

Hydration of olefins with ion exchange resin catalysts. Esso Research & Engineering Co. **788 883**

Insecticidal agents. Koninklijke Industrieele Maatschappij Vorheen Noury & Van Der Lande N.V. **788 959**

Metallising of ceramics. Erie Resistor Corp. **788 763**

Foils consisting of polymers or copolymers of vinyl chloride pre-treated for the application of hydrophilic colloidal layers. Agfa AG Fur Photofabrikation. **788 823**

Method of making catalyst. Esso Research & Engineering Co., and Grace & Co., W. R. **788 884**

Siloxane compositions and elastomers. Midland Silicones Ltd. **788 964**

Rubber-base adhesive. Armstrong Cork Co. **788 687**

Process for improving the water-absorption capacity of polyamide fibres. Farbenfabriken Bayer AG. **788 688**

Method for decolorising hydrogenated polymers. Phillips Petroleum Co. **788 967**

Antibacterial cellulosic material and preparation thereof. American Cyanamid Co. **788 968**

Saturated carbinols by the hydrogenation and hydrogenolysis of acetylenic glycols. Air Reduction Co., Inc. **788 969**

Halogenated hydrocarbons. Coc. d'Electro-Chimie, d'Electro-Metallurgie et des Acieries Electriques D'Ugine. [Addition to 749 408.] **788 828**

Thiophosphoric acid esters having pesticidal properties. Sandoz Ltd. **788 690**

Production of glycidyl ethers of polyhydric phenols. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 887**

Production of neomycin by fermentation. Upjohn Co. **788 972**

Method and means for protecting stuffing-boxes of rotary pumps from attack by any chemically corrosive, toxic and inflammable liquid being pumped. Farbenfabriken Bayer AG. **788 831**

Production of glass wool, mineral wool or the like. Vereinigte Korkindustrie AG. **788 974**

Manufacture of granulated mixed explosives containing trinitrotoluene. Aktiebolaget Bofors. **788 693**

Sodium carboxymethylcellulose compositions. Olin Mathieson Chemical Corp. **788 976**

Process for resolving mixtures consisting predominantly of acrolein, acetaldehyde allyl alcohol and water. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 889**

Carriers for radioactive materials for the treatment of animals. Henschke, U. K. **788 833**

Chromium-alumina metal ceramics. Union Carbide Corp. **788 919**

Butyl rubber latex as a fibrous material adhesive. Esso Research & Engineering Co. **788 771**

Steroids. Upjohn Co. **788 695**

Inhibitors of ozone degradation of natural or synthetic rubber. Metal & Thermit Corp. **788 834**

Phosphors. Du Pont de Nemours & Co., E. I. **788 978**

Injectable solutions of digoxin. Wellcome Foundation Ltd. (Burroughs Wellcome & Co. (U.S.A.), Inc.). [Addition to 754 489.] **788 698**

Preparation of olefine dibromides. Dow Chemical Co. **788 699**

Steroid compounds and preparation thereof. American Cyanamid Co. **788 700**

Apparatus for removing the solutes from a solution by crystallisation. Ruthner, O. **788 701**

Derivatives of androstadiene and their production. Laboratoires Francais de Chimiotherapie. **788 895**

Cyclic polysiloxanes derived from dichlorosilane and dimethyldichlorosilane. Union Carbide Corp. **788 983**

Organopolysiloxanes. Midland Silicones Ltd. **788 984**

Electroplating protective metal coatings on uranium metal. Atomic Energy of Canada Ltd. **788 838**

Detergent compositions. Unilever Ltd. **788 705**

Organopolysiloxanes Midland Silicones Ltd. **788 842**

Separation of nickel. Soc. d'Electro-Chimie d'Electro-Metallurgie et des Acieries Electriques d'Ugine. **788 706**

Production of ortho-vinyltoluene and indene. Dow Chemical Co. **788 707**

Dyeing of textile materials of polymers of acrylonitrile or asymmetic dicyanoethylene. Farbenfabriken Bayer AG. **788 708**

Copolymerisation of polyester mixtures. Chemische Werke Albert. **788 844**

Production of water-soluble aromatic resin sulphonates. Dow Chemical Co. **788 987**

Process for the manufacture of vat dyestuffs. Farbenfabriken Bayer AG. **788 777**

Distillation apparatus. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 712**

Substituted butanediol. Lilly & Co., E. **788 896**

Method of manufacturing reinforced synthetic plastic tubes. Naamlooze Vennootschap Polypress. **788 779**

Synthetic wax materials and method of preparing same. Armour & Co. **788 989**

Open to public inspection on 15 January

Film bag containers for liquids. Waddington Ltd., J., Gaunt, T.N., and Watson, N. V. **789 294**

Resinous compositions containing substituted benzophenones. American Cyanamid Co. **789 070**

Organic compounds containing phosphorus, processes for their manufacture and preparations containing them. Ciba Ltd. **789 122**

Resistor thermometers. Research Interests, Ltd., formerly Pollopas Patients Ltd., and Weisheit, G. **789 000**

Paint base and its manufacture. Jamieson, W. B. **789 162**

Producing coumarin derivatives. Spofa, Spojene Farmaceuticke Zavody, Narodni Podnik. **789 296**

Heat-hardenable resinous compositions containing epoxide resins. Bakelite, Ltd. **789 297**

Urea-formaldehyde resin fertiliser compositions. Fisons, Ltd. **789 075**

Mixed cobaltiferous complexes of monoazo-dyestuffs and process for their manufacture. Ciba Ltd. **789 002**

Methine dyestuffs. Gevaert Photo-Producten N.V. **789 077**

Ethyl thiolpropionate. Imperial Chemical Industries, Ltd. **789 003**

ρ-Substituted ethyl thiolbenzoates. Imperial Chemical Industries, Ltd. **789 004**

Thermal cracking processes and plant therefor. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **789 228**

Air-cooled condensers. Maschinenbau-AG. Balcke. **789 011**

Wax composition. Ruhrchemie AG. **789 996**

Fluid-flow temperature indicators or recorders. United Gas Industries, Ltd. **789 124**

"VULCAN" BRAND IRON AND STEEL CARBOY HAMPERS SAFETY CRATES, PACKED CARBOYS

HARRIS (LOSTOCK GRALAM) LTD.

LOSTOCK GRALAM, NORTHWICH, CHESHIRE.

Monoazo dyestuffs and their metal complex compounds. Farbenfabriken Bayer AG. **789 126**
Purifying proteins. Calcagno, L. **789 301**
Process for carbon disulphide production. Food Machinery & Chemical Corp. **789 230**
Phenthiazines. Soc des Usines Chimiques Rhone-Poulenc. [Addition to 716 206.] **789 016**
Metal-impregnated synthetic carbon materials. Schunk & Ebe Ges. **789 017**
Coal or ore washing plants. Simon-Carves, Ltd. **789 127** **789 232**
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Market Reports

BARIUM CHLORIDE REPORTED DEARER

LONDON The position in most sections of the industrial chemicals market shows little change on the week. The soda products and other routine heavy chemicals are moving in good quantities against contracts while there has been a moderate flow of new business covering spot requirements. Basic slag continues in good demand in a steady fertiliser market.

Barium chloride is reported to be dearer and the Distillers Co. have announced reductions in the industrial grades of ethyl alcohol varying from 3½d to 9d per gallon.

There has been a steady movement of supplies on the coal-tar products market with pitch in good demand on home and export account. Creasote oil and cresylic acid are also in request from home users whilst there is a fair enquiry for the light distillates.

MANCHESTER The general price position of heavy chemical products on the Manchester market during the past week has been firm, though actual changes have been few. Contracts for a wide range of textile chemicals are being taken up fairly well and most other industrial consumers are calling for steady deliveries. Fresh business has been on a moderate scale and traders are expecting the usual seasonal dullness to develop during the next week or two. Activity in the market for fertiliser materials is confined to a relatively few sections, including slag and the compounds. A continued steady demand for most of the tar products is reported.

GLASGOW For most of the past week business has been steady in the Scottish heavy chemical market. Demands have been nominal, covering the usual range of basic chemicals with quantities fairly well maintained to normal requirements. On the whole prices have remained firm. Quite a volume of export enquiries have been received, and the market continues favourable.

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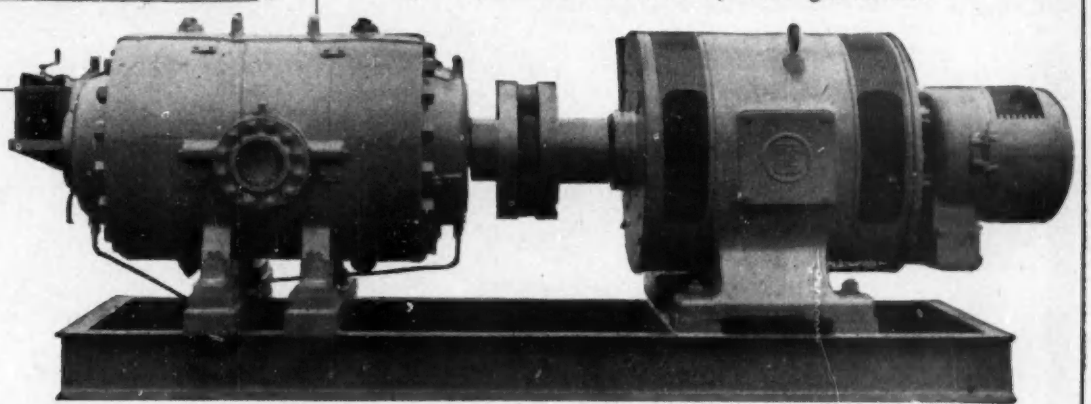

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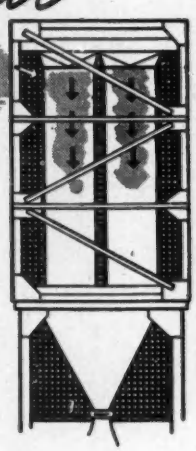

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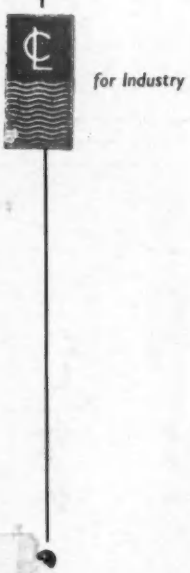

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